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System in Handling Reclaimed Packing

F. H. BECHERER'S discussion of the report of the Committee on Lubrication of Cars and Locomotives was of special interest, largely because of the fact that it is well known that the Central Railroad of New Jersey has been giving special attention to the problem of lubricating both freight and passenger cars. That its work has been productive of results is indicated by the fact that the number of freight car-miles per hotbox was increased by 8,000 in 1927 as compared with 1926, and the passenger car-miles per hotbox, by nearly 800,000. There is one feature in the Central Railroad of New Jersey's system that has a vital bearing on its successful operation. Briefly, the office of the superintendent of the car department receives a report from the various points on the railroad on the number of boxes repacked, the amount of oil and waste shipped, the amount of free oil consumed, and also the amount of waste used. These reports are consolidated at the main office, together with a report showing the cost of renovating, and from this the cost of lubricating both freight and passenger cars is calculated. In addition, a record is kept at the central plant of the amount of packing shipped in and out to different points, and a comparison of these two figures is made on a percentage basis. The percentage figure desired is 100. A figure lower than 100 per cent shows that a repair point is receiving more packing than it is returning, and if the figure is greater than 100 per cent it shows that more packing is being returned than received. The object of this is to make sure that packing is being used for the purpose for which it is intended. In addition to the excellent system of records that is in use, an equally effective system of handling has been placed in operation. Aside from the part played by the system of renovation of journal packing, the improvement in journal conditions on this road may be attributed to the systematic and accurate control exercised over every detail of journal box lubrication.

Rail Cars Indicate a Trend

RAIL motor cars exhibited at the conventions probably provided the best evidence of changes taking place in railroad operation and railroad requirements. They represent the need of special equipment for a special purpose and they are of interest to both the locomotive and car department men. They incorporate various arrangements of baggage, mail and passenger compartments, various types and sizes of motive power, and three general forms of control. They may be used with and without trailers and, to the electrical man, they present a new problem in car lighting. When operating in train-control territory, they are fitted with apparatus which is of interest to the signal department men and, should they be equipped with radio, the telegraph and telephone department would be involved. Specifically, they present another factor which requires a still closer cooperation between departments, or a change in departmental organization to make it more adaptable to the changing times.

Draft Gear Condition and Car Repairs

THE condition of draft gears, both with respect to inherent physical characteristics and maintenance, on a great majority of present freight cars is, and for a long time has been, far from satisfactory. In fact, this condition is primarily responsible for the present effort of the Mechanical Division to determine officially if possible what characteristics are most essential in satisfactory modern draft gears. It is safe to say that many railway operating and mechanical department officers with car equipment responsibilities appreciate, in a general way at least, how much present draft gear conditions are costing the railroads in damage to lading and equipment. It is natural, however, to give less attention to indirect or hidden losses than to those which show up in unmistakable terms on the daily or monthly balance sheet and require immediate explanation. As a result, the fact that car lading, car bodies and trucks are now in many cases damaged by doing the work of draft gears, made ineffective by lack of attention, excessive slack,

etc., is overlooked, because the cost is effectually concealed in loss and damage payments and car maintenance expenditures which operating officers have become accustomed to accepting as a matter of course.

Many of the best informed car men in the country today are coming to believe that big reductions in car repair costs and damage claims would unquestionably follow the expenditure of a relatively small amount of money for increased draft gear protection, (1) by the installation of the best gears available in new cars, (2) by the replacement of obsolete gears now in service, and (3) by the rehabilitation of gears now in service but with capacity reduced because of lack of attention in the past. No official figures are at present available indicating the division of car repair costs between those due to normal wear and those occasioned by shocks which draft gears fail to cushion. If this division could be established authoritatively by some committee of the Mechanical Division, following suitable investigations, it would appear to be a constructive step in the interest of better general draft gear conditions, reduced car maintenance and lessened damage claims.

Developments Always Possible

NO assemblage of equipment devices and details used in locomotive and car construction, such as has been gathered together this year at Atlantic City, is possible without bringing out many which are either entirely new or are so striking in their development that they naturally attract considerable attention. With so much that is outstanding, one is apt to overlook the developments that are taking place in fields that are old and in which it might appear that evolution had reached the ultimate.

An excellent example of what may still be accomplished by well directed work in improving one of the oldest of devices is that of the chilled iron car wheel, in which such marked improvements have been made during the past few years. For generations chilled iron wheels were in practically universal use on American cars. Then, for passenger service and for high-capacity freight cars, increasingly heavy loads and severer operating conditions, together with the demands for greater safety, brought wheels of other types into extended use. Chilled wheel design and the foundry practices employed in their production had reached a high state of development and it appeared for a time that the ultimate had been obtained and that little further could be accomplished. However, by building upon what was a solid foundation, by careful and systematic investigations and experiments, and with the hearty co-operation of the railroads, the apparently impossible has been accomplished. This year has witnessed the first radical changes made in chilled wheels for decades, and the committee in charge has recommended that the new designs of single-plate, reinforced flange chilled wheels be adopted as recommended practice in place of the old design of double-plate wheels. This accomplishment has been made possible by improved melting and pouring practices, by changes in annealing pit practices as regards application to and removal of wheels, as well as by changes in the design of the wheels themselves and by modifications of the chillers. The A. R. A. specifications have been tightened in harmony with what has been done by the manufacturer.

The whole procedure has been an excellent example of what may be done by real co-operation between maker and user. Years of work may be required, laboratory findings must be followed by changes in design and manufacturing processse and, finally, extended tests in actual service must be made before it is known with a certainty that the desired end has been reached. There are many other places where changing conditions have introduced problems which appear to be extremely difficult, if not impossible of solution. If approached in a similar spirit of co-operation future committees will be able to report similar accomplishments in other fields.

Loading Rules Committee Wins Commendation

WELL deserved tribute was paid to the Committee on Loading Rules, whose efforts are at present being directed by Chairman Samuel Lynn, superintendent of rolling stock of the Pittsburgh & Lake Erie, following the reading of the report at the Mechanical Division session Tuesday morning. Several members pointed out that this important standing committee, which conducts investigations, authorizes trial loads, holds frequent conferences with shippers in all regions and works quietly but hard throughout the year, has to its credit the development of a set of loading rules more important than almost any other single factor in the conservation of human life and property while in transport on American railways.

Railway loading rules may seem like a highly technical and prosaic subject to the average non-railroad man who has little appreciation of the magnitude of the task of providing safe transportation, of the painstaking attention to details required, or how the non-observance of a single rule may, in some cases, cause wrecks, damage to property and, more serious still, accidents and loss of life. The importance and value of the American Railway Association rules for loading freight cars are unquestioned by those familiar with them and the way in which they function.

Violations of the loading rules undoubtedly occur, with resultant hazards, difficulties at interchange points, and the necessity of changes or transfers, with their attendant expense and delay to cars and lading. It was said on the convention floor that most of the violations are occasioned by car inspectors' and shippers' lack of knowledge or understanding of the rules. In some cases it cannot be questioned, however, that infractions of the rules are deliberate, probably with the thought that the question of safety is not really involved and that possibly a less complicated or cheaper method of loading will serve just as well.

Traffic considerations have been known to be used as a club, to force acceptance of these non-standard loads by originating carriers and their passage by interchange points. The discussion of the committee report definitely developed the opinion that many shippers understand the loading rules for their respective commodities as well or better than the average car inspector, and violations caused by lack of knowledge or any other reason, are relatively infrequent. This fact, responsible to no small degree

for the reduction in transfers and more efficient operation at interchange points, is a matter for congratulation to all concerned, and indicated a general appreciation of the danger of tampering with the wide experience summed up in the present rules, or permitting any considerations to weigh in bringing about their violation. The present rules are by no means perfect and are in the process of constant revision, but needed changes should be made only in accordance with regularly recognized procedure.

A particular instance of non-observance of the loading rules was mentioned in the discussion of the report, the statement being made that 1,600 cars with non-standard loads were accepted by a certain carrier, and passed interchange points without being reloaded in conformance with the rules. It was evidently felt that the method of loading used was at least as strong, if not stronger than that required by the rules, but this is a question far too involved and dangerous to be passed on except after careful investigation properly controlled.

Non-standard trial loads are necessarily shipped at the instance of the Committee on Loading Rules, in order to afford service tests of new methods which promise improvement, but these trial loads are sent out with the specific authority of the Loading Rules Committee and receive special attention and consideration at interchange points and en route. The general trend of the discussion at the meeting made it very plain that the principle involved in sending out a large number of trial loads without the authority of the committee is entirely wrong; tends to demoralize general observance of the loading rules; and is distinctly opposed to the general interests of safe transportation on American railroads. The loading Rules Committee should be backed up to the fullest possible extent in securing a more widespread knowledge of the import, scope and details of the present rules, and a more faithful observance of them at all times.

Farewell to the Pier

THOSE who have observed from the boardwalk the imposing front of the new exhibition building at Atlantic City now nearing completion, cannot help but feel that Atlantic City is in dead earnest in its purpose to remain the convention city of America. With an exhibition floor space of 375,000 sq. ft., an auditorium which, it is said, will seat 41,000 persons, and a ballroom which will accommodate 5,000, this building, when completed, will undoubtedly take care of the exhibition of the Railway Supply Manufacturers' Association, held in connection with the conventions of the Mechanical, Purchases and Stores and Motor Transport Divisions of the American Railway Association, for many years to come, should these organizations elect to continue to return to Atlantic City. With the provision of an adjoining parking space, if such an addition to the project is possible, where tracks could be laid to accommodate the growing track exhibits, the greatest remaining inconvenience, that of a scattered exhibition, would be removed.

The floor space of approximately 100,000 sq. ft. available on Young's Million Dollar Pier has been too small to accommodate the requirements of this exhibition for several years and, even with the supplementary facilities which were provided in 1926 and again this year, it is evident that there is little opportunity for further increase in the scope of the exhibition until larger quarters are provided. Furthermore, there is always an element of chance as to the character of the supplementary space which must be temporarily provided each exhibit year, an element of uncertainty which, in itself, is detrimental to a healthy growth. Arrangements of this kind this year have proved to be highly satisfactory, but those two years ago left much to be desired.

While the use of the new structure is something to which everyone interested in the convention and exhibition can look forward with satisfaction two years hence, if it is decided that an exhibition will be held at that time, it is not without a feeling of regret that they say their farewell to Young's Million Dollar Pier, for 20 years, has been the home of the conventions whenever an exhibition has been held in connection with them. This long association, which began in 1908, would not have continued without interruption had there not been something in the atmosphere of the pier itself, as well as in Atlantic City, of unique attractiveness. There is an airiness and a holiday atmosphere about the pier which can be enjoyed without in any way detracting from serious attention to the business of the meeting or the study of the exhibits. It is a question whether this can be duplicated in the more imposing and, perhaps, more business-like structure which will be available two years hence. In giving this up, it is, therefore, fitting that respect be paid to the pier for what it has meant in the way of a unique blending of profit and pleasure to thousands of railway men from every corner of the United States and Canada.

Election of Officers

BEGINNING this year the terms of the officers of the Mechanical Division are for two years, instead of one, and expire in the even year.

During the past year L. K. Sillcox withdrew from railroad service and was unable to serve out his term as chairman. G. E. Smart, chief of car equipment of the Canadian National, the vice-chairman, was advanced to the chairmanship to serve out the term; and A. R. Ayers, general manager of the Nickle Plate, who was a member of the General Committee, was appointed vice-chairman. These two gentlemen were nominated, respectively, as chairman and vice-chairman of the General Committee, for the term which will expire in 1930, and were unanimously elected to those positions at the final session of the Mechanical Division yesterday morning.

The following were also elected unanimously as members of the General Committee: C. E. Chambers, superintendent motive power and equipment, Central Railroad of New Jersey; C. J. Bodemer, acting superintendent machinery, Louisville & Nashville; E. B. Hall, superintendent motive power, Chicago & North Western; J. E. O'Brien, chief of motive power and car equipment, Seaboard Air Line; John Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; R. L. Kleine, assistant chief of motive power, Pennsylvania; O. A. Garber, chief mechanical engineer, Missouri Pacific; and W. L. Bean, mechanical manager, New York, New Haven & Hartford.

Of these Mr. Bodemer was elected to succeed C. F. Giles; Mr. Garber was elected in place of Alexander Kearney of the Norfolk & Western, whose death occurred last month; and Mr. Bean was elected to take the position vacated by Mr. Ayers when he was elevated to the vice-chairmanship.

Mechanical Division Convention Brought to a Close

Reports on wheels, car construction and lubrication for cars complete 1928 meeting program

AT 9.30 Wednesday morning, Chairman Smart called to order the sixth and final session of the 1928 Mechanical Division convention. The session was opened by the presentation of the wheel report, which was carried over from Tuesday's program, by Committee Chairman Ripley. The remainder of the session was devoted to the presentation and discussion of reports on car subjects. Following the presentation of the report, the election of officers and members of the General Committee took place.

Report of the Committee on Wheels

In Addition to its Other Achievements, this Committee now Presents for Adoption the Wheel and Axle Manual

C. T. Ripley
Chairman

In last year's report your committee gave a full description of the single-plate cast-iron wheel design and the General Committee authorized the use of such wheels under freight cars in interchange service, provided they were marked A. R. A. X. During the past few years there have been, according to the records of the wheel manufacturers, approximately 250,000 of these wheels put into service. Your committee has attempted to get all information possible as to service performance of these wheels and it appears that up to the present time there have been practically no cracked plates, in this design, which is a remarkable performance in view of the fact that there are large numbers of these wheels used in refrigerator car service. Thermal tests of these wheels made at the foundry have shown uniformly greater strength than the old design. Some roads have adopted this wheel as standard both for repairs and new equipment and other roads would have followed the same procedure except for the question as to whether they would be permitted under interchange rules to apply such wheels to foreign cars.

During the year, the Association of Manufacturers of Chilled Car Wheels have settled on a standard design of single plate wheel with re-enforced flange, as described in our last year's report and the majority of them are now in a position to fill orders for this design. It has been difficult to get any data as to performance of this flange in comparison with the old A. R. A. flange, but investigation by the committee members indicates that it is proving to be a superior design. This type of wheel mounted with the standard gage for re-enforced flange wheels, which was adopted last year, is apparently giving no trouble in service. The backs of the flanges show no indication of undue guard rail contact.

Your committee feels that the history made with this new re-enforced flange single-plate wheel is such that the association is now warranted in adopting it as recommended practice in place of the old style double-plate standard flange wheel and recommends that this action be taken. The four designs are shown in Figs. 1, 2, 3 and 4.

Cast Iron Wheel Specifications

The new specifications prepared by the committee as standard for all cast iron wheels, covers practically the same points as covered in the specifications for cast iron wheels for locomotives, tenders and cars which were adopted in 1893 and revised in 1923. In its introductory remarks to the proposed specifications, the committee stated that it believed that the specifications for cast iron wheels should be so changed as to require more exacting thermal tests by increasing the width of the channelway and times. Actual experience at the foundry and in the inspection of these wheels showed that the design is such, if properly made, that it will stand these exacting tests. In order better to protect the service performance it recommended that the specifications be changed in this respect.

Another point which it felt should be included in the cast iron wheel specifications is the general detail of foundry practice. The strength of a cast iron wheel is vitally dependent upon the practice followed in the foundry, particularly as regards annealing. The manufacturers have started a joint inspection service to regulate this question of foundry practice. It is felt, however, by the committee that the limitations should also be included in the standard specifications. It has prepared a new specification which it has submitted to the association for adoption as standard for all cast iron wheels. The following contains only those specifications that have been changed from those already adopted as recommended practice and published in the manual, or those proposed as new.—(Editor)

Chemical Composition—The wheels shall conform to the following requirements as to chemical composition:

Combined carbon, maximum 0.90 per cent.
Total carbon desired, minimum 3.35 per cent.
Manganese, minimum 0.50 per cent.
Phosphorus desired, maximum, .35 per cent.
Sulphur, maximum 0.14 per cent.

Sulphur Content—The essential condition of chemical composition of cast iron wheels is a balance between sulphur, silicon, carbon and manganese, and variation in these constituents must not disturb this relation. If on check analysis the sulphur is found to be not more than 0.02 per cent more than specified it should not be considered sufficient cause for the rejection of the wheels, provided that the wheels from this foundry have met all physical tests and inspection and provided that the manganese is, at least, three and one-half times the sulphur. Such failure to meet the specification should be called to the attention of the manufacturer and following shipments or lots must conform to the specification.

Shipment of Wheels—The purchaser should not require the manufacturer to hold all lots of wheels until a check analysis can be obtained unless it has been found that this particular manufacturer's output has been running outside of specifications.

Dimensions—The normal diameter of the wheels produced by the chiller must be A. R. A. standard 33 in. measured at a point 2⅝ in. from the outside of the tread of the wheel. Wheels shall not vary more than $^{6}/_{16}$ in. above or below the normal size measured on the circumference. Each wheel shall be so nearly circular that a true metallic ring, placed on its tread and bearing somewhere on the cone, shall, at no point, be more than $^{1}/_{32}$ in. from the tread. The thickness of the flange shall be within the maximum and the minimum flange thickness gages adopted by the A. R. A. for new wheels. That is, the flange must take the maximum gage and must not take the minimum gage. The flange thickness on any individual wheel must not vary more than $^{1}/_{16}$ in., the thickness to be measured at a point ⅝ in. above the base line of the tread.

Taping—All wheels shall be taped by the manufacturer with the A. R. A. standard tape or an approved equivalent. The normal wheel having a circumference of 103.67 in. shall be designated as Tape 3 wheel, limited by $^{1}/_{16}$ in. over and under the normal circumference. The smallest diameter of wheel acceptable under the specifications will be designated as Tape 1 wheel, the largest diameter acceptable under the specifications as Tape 5 wheel. Each tape size will cover a range of ⅛ in. in circumference. The wheels will be made with five small lugs cast on the back of the plate under the rim. When taping the wheel a sufficient number of these lugs are to be cut off, allowing the proper number to remain to represent the tape size. Under no circumstances are any of these lugs to be cut off after the wheel is received from the foundry. These instructions are for new wheels coming from the foundry. If the purchaser so specifies, the tape sizes may be painted on the wheel.

Weights—(d). Wheels shall be in accordance with the weights shown in table 1, based on the 1928 A. R. A. drawings.

7. *Thermal Test*—(a) In making the thermal test, the wheel shall be laid with the flange downward in the sand with the channelway 4 in. deep and width as shown in Table III, molded in green sand around

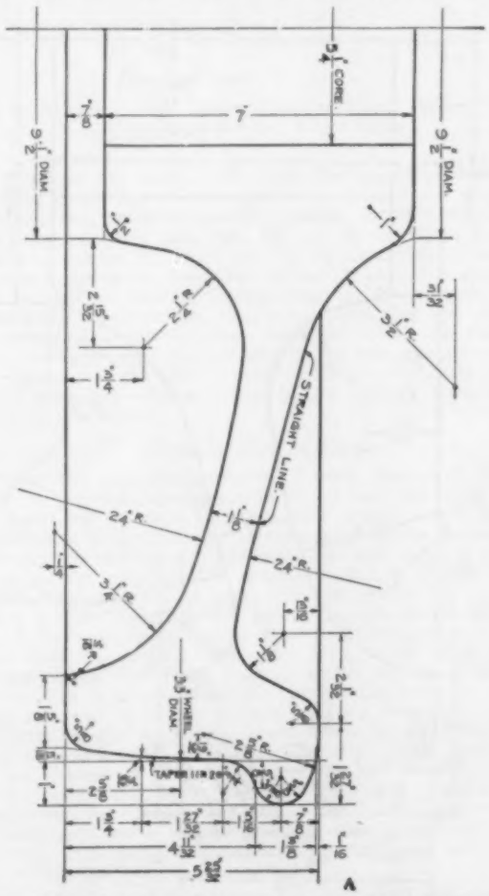


Fig. 1—33-in. Cast-iron Wheel for Cars of Maximum Gross Weight Not To Exceed 103,000 lb.—650-lb. Wheel for 4¼-in. by 8-in. Axle

the wheel, the tread of the wheel to form one side of the channelway, and the clean flange forming as much of the bottom as its width will cover. This channelway shall be filled with molten cast iron, which shall be hot enough when poured so that the ring cast, when the metal is cold, will be solid and free from wrinkles. The time when pouring ceases shall be noted, and after the time given in Table III has elapsed, an examination of the wheel shall be made. If a crack develops in the wheel within the time limit specified in Table III, all wheels bearing the same tape size shall be rejected. The use of a permanent mold for making the thermal test in place of the above described sand mold is

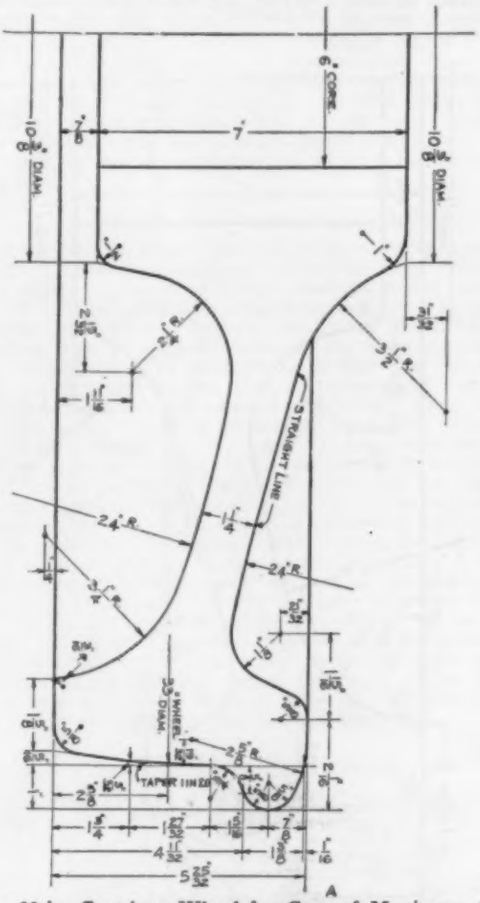


Fig. 2—33-in. Cast-iron Wheel for Cars of Maximum Gross Weight Not To Exceed 136,000 lb.—700-lb. Wheel for 5-in. by 9-in. Axle

permissible. The permanent mold consists of an iron ring and bottom board of such dimensions that the wheel to be tested can be immediately placed in the mold and centered to the required channelway.

TABLE III

Weight of Wheel, lb.	Cooling Time, min.	Width of Channelway, in.
650	3	2
700	5	2
750	5	3
850	7	3

10. *Marking*—All wheels shall be marked and numbered consecutively in accordance with instructions issued by the purchaser. All wheels shall bear the initials of the purchaser, wheel number, weight of wheel, month, day and year when made and for indicating the tape number, five small lugs ⅜ in. high to be cast on the back of the plate under the rim.

All wheels shall have the name of the manufacturer and place cast on the front of plate. Wheel numbers once rejected shall remain unfilled. All wheels conforming to requirements of these specifications shall have plainly marked on the front of plate "A. R. A. 1928."

Foundry Practice Requirements

13. *Composition*—The composition of the mixture shall be such that it will produce the analysis specified and an adequate depth of chill in the wheel.

14. *Chill Test Block*—A chill test block must be taken at least once out of every ten wheels poured. The size of the test bar shall be 1½ in. by 3 in. by 6½ in., the 1½-in. face to be placed against the chiller.

Note—The depth of chill measurement shall be recorded in sixteenths.

15. *Analysis Test Block*—(a) A test block 3 in. by 3 in. minimum shall be cast, preferably in dry sand, to represent each forty wheels.

Note—The drillings shall be obtained from the end of the test block, the first drillings shall be discarded, the drilling continued, and the resultant chips, etc., dumped from the hole and taken for sample, or the block may be broken and the drillings taken at the point of fracture.

(b) An analysis may be made for each block and recorded or, at the option of the manufacturer, the samples may be mixed of equal quantities, but at least one analysis shall be made to represent the day's heat.

16. *Irregularities*—The irregularities in the foundry, which produce failure from seams, broken flanges, broken rims, broken treads, are almost entirely traceable to care and preparation of the ladles for service, and failure to pour the metal at the proper speed and at the proper temperature.

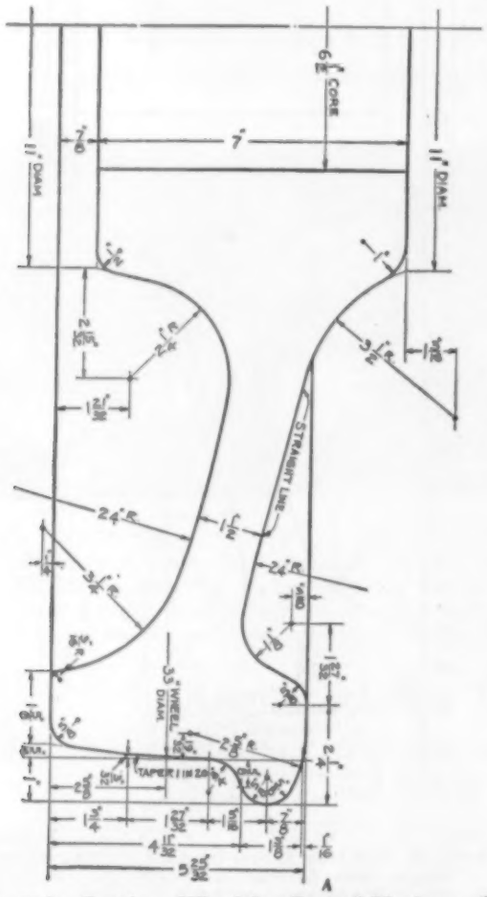


Fig. 3—33-in. Cast-iron Wheel for Cars of Maximum Gross Weight Not To Exceed 169,000 lb.—750-lb. Wheel for 5½-in. by 10-in. Axle

17. *Temperature*—The iron shall be melted and poured at a temperature sufficiently high to eliminate any possibility of cold iron defects such as wrinkles in the tread, blow holes in the plates or rims, etc.

Note—It is recommended that the temperature of the molten metal as poured into wheel molds be not less than 2,400 deg. F.

18. *Ladles*—(a) During the heat, the bull ladle, which shall be of the tea-pot type, shall be kept at least half full of molten metal, for better mixing of the metal and for preserving a uniform temperature.

(b) The bull ladle and small ladles shall be thoroughly heated prior to use.

(c) Ladles shall be heated by the use of an oil burner, in which the heat is applied for a sufficient length of time to dry the lining thoroughly all the way through to the metal shell. It is preferable to heat the small ladles in specially designed ovens with closed doors, in which the ladles can be thoroughly baked throughout. Before any ladle is put in service, it shall have been two-thirds filled with molten iron which shall be discarded after two minutes.

(d) An alternative method is to give the ladles a preliminary heating with wood, coke, oil or gas fire, then fill the ladle at least two-thirds full of molten iron. After two minutes the metal shall be discarded and the ladle immediately placed in service.

19. *Last Iron*—Under no conditions shall the last two ladles of iron in the reservoir or bull ladle be poured into wheels, nor shall iron which has been transferred from one small ladle to another be poured into the wheel molds.

20. *Pouring*—In ordinary pouring the metal must be transferred from the bull ladle to the mold as quickly as possible, not more than two minutes shall elapse between the time the small ladles are filled and the wheel poured. Under no circumstances shall any material be placed in the bull ladle or pouring ladle, nor any other artificial means used, for cooling purposes. When starting to pour a mold no let-up or intermission is permissible. This is most important, as it is essential that the metal be poured in a fast and steady stream. The time for pouring wheels of various weights shall not exceed the following: 650-lb. wheels, 11 sec.; 700-lb. wheels, 12 sec.; 750-lb. wheels, 13 sec.; 850-lb. wheels, 15 sec.

21. *Shaking Out*—Wheels shall be shaken out from the mold as quickly as permissible without bleeding. The interval of time between pouring and shaking out must not exceed the following limits: 650-lb. wheels, 40 min.; 700-lb. wheels, 45 min.; 750-lb. wheels, 55 min.; and 850-lb. wheels, 65 min.

After the wheels are shaken out they must be transferred to the annealing pit and pitted, not to exceed four minutes for the entire operation; the average time should not exceed two minutes. The time shall start with the lifting of the cope.

22. *Pits*—(a) At the time of pitting, the temperature of the air in the middle of the pit, with the cover closed, shall be not less than 600 deg. F., preferably 800 deg. F. or over.

The pits shall preferably be as deep as practical in order to reduce the number of top pit wheels. The maximum depth is limited by the ability to remove the wheels and maintain the temperature specified.

(b) Pits which have not been in daily use must be fired a sufficient length of time not only to heat and dry the pit, but also to heat the surrounding enclosure. The pit temperature shall be ascertained and recorded before the wheels are placed in them.

23. *Rate of Cooling*—The treads of wheels when placed in the pits must be of a cherry red color, indicating a minimum surface temperature of the plates of 1,350 deg. F. or more.

The rate of cooling shall be such that 24 hours after the pit is closed the temperature of the top wheel shall be not less than 900 deg. F. The top and second wheels shall be repitted. This shall be done before the temperature of the wheels in question has dropped below 900 deg. F.

24. *Pit Covers*—(a) The cover shall be so insulated as to prevent as far as possible rapid transfer of heat from the top wheel. A space equal to at least two wheels shall exist between the bottom of the cover and the top wheel.

(b) The pit covers must be placed as quickly as possible after the pit is filled with wheels.

(c) The primary pit covers must remain undisturbed until time for removal of the wheels, and must be replaced as soon as the wheels are removed.

25. *Pyrometers*—(a) In order to determine the temperature of the pits and hot wheels, a portable pyrometer must be provided. Thermal couples must be provided for obtaining the temperature of the pits and of hot wheels from the foundry, and as removed from the primary pit.

(b) The handle of the thermal couple must never be lowered into the pit. The temperature readings will be obtained as follows:

The pit cover shifted to one side just enough to admit the thermal couple, which is lowered to the middle portion of the pit; care being taken to keep the tip from contact with the brick lining.

(c) The temperature readings of the plates shall be obtained as follows:

The tip of the thermal couple is applied to the face of the wheel midway between the hub and the rim, and contact made with the metal surface, tip of thermal couple being protected from air currents.

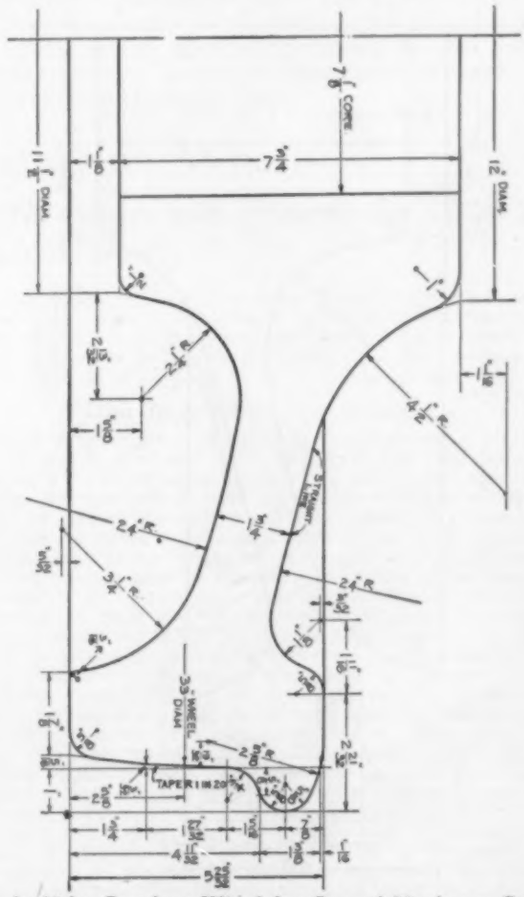


Fig. 4—33-in. Cast-iron Wheel for Cars of Maximum Gross Weight Not To Exceed 210,000 lb.—850-lb. Wheel for 6-in. by 11-in. Axle

(d) When taking the temperature of newly fired pits, the tip of the thermal couple must be kept well away from the glowing coals and flame.

(e) A pyrometer suitable for taking the temperature of molten metal should be provided.

26. *Selection of Test Wheels*—In selecting the wheels for test, careful consideration must be given to the following items, which may affect

the strength of the wheel: Position in the pit (top pit, second top pit or any other position which has proved questionable); high shrinkage; lightest design; chill on the test piece; last wheels poured; new ladles; any indication of cold iron; interruption of service; ladle treatment.

At least one manufacturer's test shall be taken from each cupola each operating day and 50 per cent. of the tests shall be thermal tests.

27. *Chill on Wheels*—The combined depth of the chill and mottled metal shall be not less than ¾ in.

28. *Plant Operation*—When plants are operated less than six days per week, care should be taken to avoid so far as possible consecutive "shut down days."

Records—A permanent record shall be maintained of the following: Wheel number, name of railroad, type of wheel, diameter of wheel, actual weight of wheel, date made, tape size of wheel, order of pouring, location of wheels in primary pit (top and second top), chill on test piece, irregularities or interruption in service, details of shop tests and rejections, condition of iron during heat, bull ladle treatment, individual ladle treatment, temperature of iron from pouring ladle, wheels pitted at improper temperatures, all temperatures taken, first wheel poured from any ladle, and chemical analysis.

Wheel Mounting Gage

If the re-enforced flange wheel is adopted by the association, as recommended in the first section of this report, the standard wheel mounting gage of the association will have to be suitable

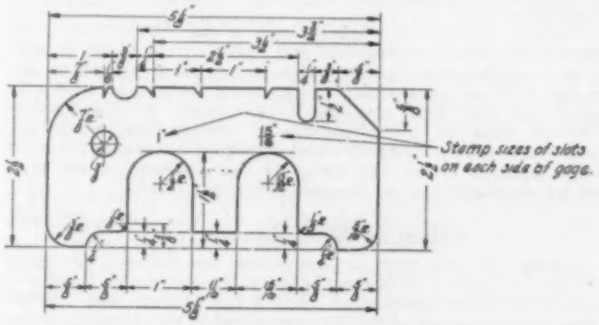


Fig. 5—Wheel Defect, Worn Coupler Limit, Worn Journal Collar and Journal Fillet Gage

for this type of wheel. Last year the association adopted a mounting gage for re-enforced flange wheels and there are, therefore, two standard mounting gages. Experience with this new wheel mounting gage (see Fig. 118 in the Wheel and Axle Manual), appears to have been entirely satisfactory and the committee makes no recommendation for any change. However, in view of their recommendation for the adoption of the re-enforced flange design, they recommend that the old gage for mounting standard flange cast-iron wheels be eliminated from the standards. As explained in our last year's report, the new design gage can also be used on the old style flange wheels, as the check gage distance, that is, the distance from back to throat is the same.

Wheels Out of Gage

During the year the attention of your committee has been called by railroad representatives to the fact that some wheels are found out of gage and that some action should be taken to overcome this condition. Investigations made indicate that most of these cases are due to bent axles and some to improper boring of the wheels. The committee has in former reports recommended that second-hand axles be put in the axle lathe to find if there is any bending before they are remounted.

As regards improper boring, your committee has consistently called attention to the necessity for better wheel shop practice and the Wheel and Axle Manual, which will be referred to later in this report, has for its purpose the securing of such better practice. It is the thought of your committee that the inspectors of the A. R. A. should check up this question of wheel shop practice in their trips over the various lines. With the new manual as their guide, they can call attention to poor practice wherever found. We feel sure that conditions can be improved by conscientious use of the manual and we trust that necessary action will be taken by the various roads, both for their own protection and the protection of other roads over which their cars are operated.

Maximum and Minimum Flange Gages

In last year's report your committee recommended and the association adopted a new maximum flange gage (see Fig. 60 in the Wheel and Axle Manual), for use on new re-enforced flange cast-iron wheels. If the association adopts the new flange as standard, as recommended in the first section of this report, it will also be necessary to adopt a minimum flange gage. With the old flanges an allowance of 1/16 in. over and 1/16 in. under normal was permissible. The committee felt that these limits were too wide and the manufacturers have agreed that they can work to closer tolerances. Therefore, it is proposed with the new type of re-enforced flange wheel to limit flange thickness tolerance to 3/32 in. The old type of maximum flange gage shown in Figs. 7 and 61 in the Wheel and Axle Manual, for use on standard flange wheels is within 1/64 in. of the proposed minimum for reinforced flange wheels and to avoid the necessity of the railroads purchasing new gages, it is recommended that the old maximum flange gage be adopted as a minimum flange gage for the new re-enforced flange wheels and the old minimum flange gage shown in Fig. 8 of the Wheel and Axle Manual, be retained for use on steel wheels only.

Gaging and Journal Length

In the committee report for 1926 there is shown a standard method of measuring length of journals of axles. Since that time a number of gages have been submitted to the committee. Some of them are patented and some unpatented. The majority of these gages do not measure the journal length in strict accordance with the methods set up by the wheel committee, as above referred to. The committee still feels that this method is the fairest and best, and does not recommend the use of any gage which does not measure accordingly. It is believed that many axles are being improperly condemned because of the use of a wrong type of gage and the committee again wishes to call the attention of the association to the standard method which has been established. It is not felt that any unpatented gage has been presented which can be recommended as standard for the association. The committee will, however, continue to review all designs submitted with the ultimate intention of establishing a standard gage. In general it appears that inspectors are often over-technical in condemning axles for over-length journal. There is no factor of danger involved in this defect and condemnation for over-lengths of 1/32 in. for example are not good practice. We may also call attention to the practice followed in some cases of turning down the dust guard seat in an effort to shorten the length of the journal. This is poor practice as metal is taken off at a vital part of the axle and the fit in the dust guard is spoiled.

Worn-through Chill Defect

Your committee has during the past six years gradually developed changes in the rules covering cast-iron wheel defects,

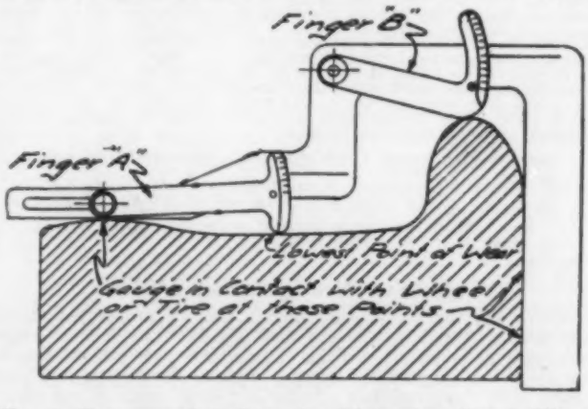


Fig. 6—Recommended Gage for Measuring Tread Worn Hollow for Locomotive Tires

whereby the so-called judgment defects have been changed into measurable defects. The main purpose was to stop the wholesale condemnation of wheels under cars on foreign roads. When one wheel of a pair has a condemnable defect there is a tendency to condemn the mate wheel, particularly with an owner's defect in order to avoid the necessity of remating. Formerly the tread-worn-hollow defect was the favorite one to charge against the mate wheel. This was stopped by the adoption of the tread-worn-hollow gage. The chipped-rim rule was also similarly abused, but last year's revision helped to stop this. At the present time the major defect which is thus improperly used is that of worn-through chill. A number of railroads have called the attention of your committee to the improper condemnation under this defect and its investigations indicate that their contentions are correct. Wheels are being taken out for worn-through chill, which have a slightly mottled appearance

on the tread or feel slightly rough on the tread. This has been found to be an improper method of determining a worn-through chill. Wheels thus condemned have been broken up and it was found that sufficient chill remained in the tread.

These investigations lead the committee to recommend that an interpretation be added to the rule to the effect that a wheel is not condemnable for worn-through chill until a flattened spot has developed. If the chill is actually worn through, a flat spot of this type will develop and it is the only true indication of worn-through chill. It should not be confused with a slid flat spot.

Wheel Defect Gage

The Arbitration Committee in 1927 established a new rule covering chipped rim under Rule 78. This requires a measurement of 3½ in. in certain cases. On the present wheel defect gage there is no provision for such measurement. Requests have been received from some roads for a change in the standard drawing of this gage to indicate this measurement.

Attention has also been called to the fact that no radius has been shown for the left-hand corner of the gage. This has resulted in some gages being made with an improper radius. The correct radius is ⅞ in. and it should be shown on the drawing.

In the 1926 report of the Wheel committee attention was called to the advantage of having a notch cut in the top edge of the gage, ⅞ in. from the left-hand side, for use in measuring vertical flanges on cast iron wheels in cars of 80,000-lb. capacity or over.

Fig. 5 shows revised drawing of the wheel defect gage, including these three changes. The Wheel Committee recommends that this drawing be inserted in the code of rules to replace the drawing now shown on Page 87.

Measurement of Tread Worn Hollow in Locomotive Tires

There is no standard gage for the measurement of a tread worn hollow for locomotive tires and there is considerable confusion in this measurement on various railroads. For information a type of gage is shown in Fig. 6 which is used on one road. This gage measures correctly the hollow wear and flange height in accordance with the I. C. C. rules. The gage is unpatented. The method of using the gage is given as follows:

Apply the short leg of the gage to the back of the tire or wheel, the short leg to be held firmly against the inside of the machined surface as shown in Fig. 6. The long leg projecting over and resting upon the high portion of the tread. Adjust location of finger *A* so that a reading may be taken at the lowest point of wear in the tread. Depress finger *A* so that it touches the tread and read the amount of tread worn hollow.

To measure the height of flange apply the gage as for measuring tread worn hollow; take tread worn hollow measurement. Depress the finger *B* so that it touches the top of the flange, and read the graduations on *B*. The height of the flange is 1½ in. minus the reading on the finger *B*, plus the reading on finger A.

Example: Reading on Finger $A = {}^{5}/_{16}$ in. (amount of tread worn hollow.
Reading on finger $B = {}^{5}/_{16}$ in.
The height of the flange will be 1½ in. $- {}^{5}/_{16} + {}^{5}/_{16} = 1\frac{5}{16}$ in.

Note: If the reading on finger *B* is the same as the reading on finger *A*, the flange will be 1½ in. high.

Defects in Wrought Steel Wheels

There has for many years been a lack of proper definitions for defects found in wrought-steel wheels. The code of rules has never definitely defined the various defects which develop in service. The committee has been working during the past few years with representatives of the Wrought Steel Wheel Manufacturers' technical committee to agree on a complete classification and definition of these defects. The sub-committee went over a large number of wheels with the manufacturers' representatives and made a careful study of all of the defects found. In the accompanying proposed Wheel and Axle Manual, these defects are completely classified and defined. Recommendations have also been made to the Arbitration Committee to change the rules covering steel wheel defects, so as to agree with these definitions. A complete photographic record to clarify the definitions is also included in the manual and it is recommended that reference to these photographs be made in the rules. It is felt by your committee that a real step in advance has been made in this regard.

Engine Truck Wheels Recommended as Standard

Diameter of wheel in.	Front projection in.	Back projection in.	Front hub diameter in.	Back hub diameter in.	Hub length in.	Minimum thickness of plate, in. Above hub	Minimum thickness of plate, in. Below rim
28	11/16	11/16	10	12½	7⅛	1	¾
30	11/16	11/16	10	12½	7⅛	1	¾
30	11/16	11/16	11	16	7⅛	1	¾
33	11/16	11/16	10	12½	7⅛	1	¾
33	11/16	11/16	11	16	7⅛	1	¾
36	11/16	11/16	10	12½	7⅛	1	¾
36	11/16	11/16	11	16	7⅛	1	¾

Engine Truck Wheels

In last year's report the committee gave a list of engine-truck wheels which it recommended as standard. After further study, a slight modification of this list is recommended and your committee has referred the list shown in the table to the locomotive committee for their approval.

The association has never had any standards for engine truck wheels and it is felt that such a list would be desirable. Though there is no interchange it is very beneficial from a manufacturing viewpoint, as well as maintenance to have some standardization.

Another question of a similar type is the standardization of wheels for electric locomotives and motor cars. At the present time it appears that the designers of this latter equipment are paying little or no attention to the usual designs of wheels in order that they may get desired clearances. It is a question whether some of the alterations in design being made are undesirable. Your committee is arranging to co-operate with the manufacturers in the study of this question to see if a set of standards can be developed for this service.

Relations With Manufactures

During the past year the committee has followed its usual practice of holding a meeting with representatives of the Association of Manufacturers of Chilled Car Wheels and another with representatives of the Wrought Steel Wheel Manufacturers' technical committee. Both of these groups have co-operated with us to a maximum degree and have done everything possible to assist us in improving the quality of their products, and we wish to acknowledge our indebtedness to them for this co-operation. It is the intention of the committee to follow a similar procedure during the coming year.

Wheel and Axle Manual

In 1925 the committee presented a tentative draft of the Wheel and Axle Manual. The issuance of the final recommended manual has been held up since that time, due to tests and inspections made in connection with the revision of the section dealing with wrought-steel wheel defects. This particular subject has been cleared up during the past year, as outlined earlier in this report. The committee, therefore, is now able to present the complete Wheel and Axle Manual for adoption as recommended practice.

In addition to the steel wheel section, the remaining portions have been entirely re-written and much new material added, both in the light of further experience and of changes made in the association rules, practices and standards. The preparation of this manual has involved a great deal of work and it is possible that the members may find sections which need some further revision. The committee will be very glad to give careful consideration to any such suggestions which are brought to its attention. There is a distinct need for such a manual, as referred to in this and in former reports, and it is well recognized that there is need for improved wheel shop practice and an improvement in the gaging of defects in wheels. A better understanding of wheel defects will result not only in a saving in wheel costs, but also in greater safety in operation. It is again recommended that the various railroad companies have either some official or committee charged with the responsibility for the handling of wheel work. A number of railroads have adopted this practice and the results have been gratifying.

If the association adopts this manual as recommended practice, it will be issued as soon as possible in a size uniform with the Rules of Interchange. A complete alphabetical index of subjects covered and illustrations shown will be added.

Recommendations for Letter Ballot

In conclusion the committee recommends that the following propositions be submitted to letter ballot:

1—That the re-enforced-flange single-plate cast-iron wheel, as shown in Figs. 1 to 4 be adopted as recommended practice of the association.

2—That the title of the cast-iron wheel-mounting gage for re-enforced-flange wheels, which was adopted as an alternate

standard in 1927, be made "Standard Mounting and Check Gage for Cast-iron Wheels."

3—That the old maximum flange gage be adopted as standard for minimum flange gage for cast iron wheels and the use of the old minimum flange thickness gage be restricted to steel wheels.

4—That the Wheel and Axle Manual be adopted as recommended practice of the association.

5—That the revised specifications for cast-iron wheels be adopted as recommended practice.

The report is signed by C. T. Ripley, (chairman), chief mechanical engineer, Atchison, Topeka & Santa Fe; O. C. Cromwell, assistant to chief motive power and equipment, Baltimore & Ohio; G. B. Koch, general foreman foundry, Pennsylvania; H. W. Coddington, engineer tests, Norfolk & Western; A. Knapp, inspecting engineer, New York Central; J. Matthes, chief car inspector, Wabash; and C. Petran, superintendent tools and machinery, Chicago, Milwaukee, St. Paul & Pacific.

Discussion

Chairman Smart: We are accustomed to have a splendid report submitted by this committee, but this year they have certainly excelled themselves. It is the result of a great deal of hard work. It has taken quite a time to collect this data and present it in the way they have. This is the first year that we have had radical changes made in the single-plate wheel as compared with the old double-plate wheel.

We have all been looking for a manual of this kind, something that we can put in the machine shop, in the hands of inspectors. This is not an office copy.

A. Knapp, (N. Y. C.): The section on wrought steel wheel defects contains sufficient information on all defects occurring in this type of wheel to permit quick and accurate classification of any case which may arise.

All the defects are specifically defined and 38 photographs have been collected to supplement the definitions. As a result of our co-operative study with the Technical Committee of the Wrought Steel Wheel Manufacturers we have been able to offer definite advice and instruction as to whether it is better, in the interest of economy and safety, to turn wheels and put them back in service or to withdraw them from service for further investigation. References are given in each case to the governing A. R. A. Interchange Rules. We have not attempted to go into the causes of controversial defects because the Technical Committee of the Wrought Steel Wheel Manufacturers has undertaken an extensive research program for this specific purpose.

The tread worn hollow wheel defects, as applied to cases under the I. C. C. Locomotive Inspection Rules, as mentioned in paragraph 41, has had considerable discussion and numerous gages have been designed to measure it. One of the member roads has developed a gage which satisfactorily measures the hollow wear and flange height. The gage is illustrated in Fig. 9 on Page 22 of the committee report. It does not affect or displace the use of the A. R. A. steel wheel gage for measuring tread worn hollow or high flange in the A. R. A. interchange work.

In order to identify more clearly and accurately some of the more unusual and serious defects, it was found advisable to introduce six new terms: burnt rim, shattered rim, spread rim, sub-surface defect, thermal cracks and built-up tread. The Arbitration Committee has been asked to incorporate all except the last of these terms in the Code of Interchange Rules.

Manufacturers as well as users are interested in this phase of wheel work and both desire to avoid the continuation or re-application in service of wheels which might give further trouble. It is to the best interest of both manufacturer and user to prevent scrapping a wheel which should be turned or turning a wheel which shows evidence of inherent defects. In order to make possible the proper disposition of such cases and in order that wrought steel wheel records may in the future be more explicit and accurate, you committee has restricted the term, shelled tread, as defined in paragraph 34 on page 41, to those wheels which have removable defects and which can be properly turned and put back into service. Other wheels which hve defects of a more serious nature should be classified as burnt rim, shattered rim, spread rim or sub-surface defect, as specified in detail in the Manual, and held for further careful investigation by those qualified to handle final disposition.

We realized that it would not always be possible for the wheel men to classify a wheel as shelled tread unless some simple test were provided to aid in such classification. We have, therefore, specified that in case of doubt, the wheel should be placed in a lathe and a spotting cut taken in the center of the tread with a round nosed roughing tool. This is also explained under Wheel Lathe Practice on page 160. If the depth of the defects exceeds 3/8 in., the wheel should be classified as shattered rim pending further investigation. The term shattered rim is here used only as a temporary classification in order to simplify the procedure in reporting the wheel for investigation.

This provision will guide the wheel men in judging practically all cases and insure that wheels which are inferior in quality will not be reapplied in service and, on the other hand, will avoid waste of sound material in wheels which, after the defective material has been removed, may be reapplied to service. The liability of redevelopment of the same defect in such a case would not be any greater than in the case of another wheel replacing it.

On the subject of plate defects, paragraph 47 on page 56 calls attention to the danger of applying a torch or electric arc to any portion of a wrought steel wheel. Although such practice is prohibited in the A. R. A. Interchange Rules we still receive occasional reports of wheels removed from service on account of cracks in the plates which had their origin in holes burned in the plates. It would appear that some shops have not been advised about the danger of this practice, and we would urge that each of the member roads of the Association take particular pains to see that this practice is not followed in any of their shops. Such wheels found under cars should, of course, be removed from service.

The Wrought Steel Wheel Manufacturers' Technical Committee has requested the aid of your committee in securing more complete and accurate information about wrought steel wheel service. Because of the value of this information for the improvement of wheel service, we have arranged with some railroads to furnish reports of results obtained by service tests and would appreciate the cooperation of any other members of this Association in securing additional records of this sort. Such information, if available, may be submitted to the Secretary of the Association, to the chairman of your Wheel Committee or by the individual railroads directly to the manufacturers of the wheels represented in the tests.

The requirement of transportation insofar as wheel service is concerned is receiving the best attention of all the wheel manufacturers. Many improvements have been made in plant, process or practice during the past year, and it is most pleasing to observe that practically all of these changes are to insure a better quality of product rather than to increase production. The outlook for the future is very encouraging.

O. C. Cromwell, (B. & O.): As a member of the Wheel Committee, I want to explain some of the phases of the chilled cast iron wheels that we have given study to. In order to arrive at a true interpretation of defects and causes of failures, these defects are tabulated. Heretofore, in studying the tabulations we had considerable confusion, the different inspectors defining the same defect under a different name. Therefore, we would like to impress on you the importance of using the definitions referred to in the manual. That will enable the railroads to study these defects and find out how they may be cured.

The changes in the specifications are quite marked. The thermal test has been materially increased because we have found that the foundries are treating the wheels much differently than before.

The chairman referred to the foundry practice as recommended in the Manual. The committee has known that shop practice in all things is the important thing that we have to control, so shop practice, when you come down to foundry and wheels, means foundry practice.

In the manufacture of materials, the critical temperature is the most important one item, after you have started with the correct material, to be controlled. The wheel manufacturers have in the last few years given considerable attention to ascertaining the critical temperatures. Therefore, they have discovered that if the wheel can be placed in the pit sufficiently early, that is, before it begins to set, the grandular structure of the casting can be so adjusted in cooling down at a controlled temperature as to produce the finest and best grain structure. These grain structures will take care of the heat that is transmitted from the brake shoes into the plate of the wheel.

The wheels are now taken out of the pit at a temperature that was thought suicidal two years ago, but it has been found we can take them out at that temperature, visibly red, and pile them in a protected open place, and not affect the strength of the wheel, showing that we have control of the annealing of the wheel at the proper temperature.

The time of pouring is important. The iron must be poured from the cupola into the ladle, from the ladle into the mould, and then the cast wheel from the mould into the pit, as rapidly as possible. The manufacturers have been giving considerable attention to the question of the pitting of the wheel so that it will not be shocked with low temperature.

They have been making wonderful progress, and the test of both single and double faced wheels shows a very marked increase in the strength, both in drop and thermal tests.

George Doak (President, Chilled Car Wheel Manufacturers Association): The Association of Manufacturers of Chilled Car Wheels is composed of some 24 companies, operating 58 foundries in the United States and Canada. This includes all of the chilled tread wheel manufacturers, with the exception of three or four railroads which are operating wheel foundries.

During the past year, we have installed in our laboratory an electric annealing furnace which will take an entire wheel. Not a sample cut from the wheel, but the entire wheel. We have uncovered and developed some interesting information, and this is passed on from time to time to our members, and they are all taking decided advantage of it in improving their annealing practices. This can only result in one thing, and that is a much finer, stronger, better wheel.

We have received, during the past two years, wonderful co-operation from a number of railroads. We would appreciate receiving it from all of you to this extent: that you advise us of any troubles you may be having with your chilled tread wheels. As soon as we receive advice, we canvass this situation with the manufacturer concerned. He searches his records, puts his finger on the trouble, and corrects the condition.

The report of the Brake Committee, given the other day, brought out some important facts. With the corrections or adjustments, and bringing into proper line the braking condition of cars equipped with chilled wheels, we may hope to give you a performance that is entirely satisfactory. The majority of the wheel failures of today are governed by stuck and dragging brakes or overheated wheels. The manufacturers, by their improved annealing practices, are going to attempt to give you a wheel that will stand that punishment, but the railroads should do everything possible to co-operate in this matter.

Mr. Brazier: I move this report be accepted. (The motion was seconded and carried.)

Report of Committee on Car Construction

Designs for hopper and automobile cars well advanced———Work started on refrigerator cars———Trucks and other details considered

A. R. Ayers
Chairman

Following the practice of recent years, the committee delegated the various assignments given to subcommittees, whose reports follow.

Fundamentals of Car Design

The subcommittee was instructed to revise the calculations for the single-seated box car in accordance with changes which have been made in some fundamental dimensions, namely:

(a) Increase in end sill overhang from 5 ft. 0 in. to 5 ft. 6 in.
(b) Increase in width of underframe from 8 ft. 9 in. to 8 ft. 9⅜ in.
(c) Increase in thickness of floor plank from 2¼ in. to 2⅜ in.

These changes necessitated an entire revision of the original calculations, and the work was delayed pending decision as to increase in end sill overhang and width of underframe, but revision of calculations is now well under way. The changes in dimensions will not, however, necessitate any alterations in the sections of the various side framing members.

The underframe deflection calculations have been omitted from the revised report for the reason that they involve a great amount of additional work, and even though revised, would not affect the conclusions originally reached, namely:

(a) That unyielding supports may be safely assumed.
(b) That crossbearers should be located at the door posts.

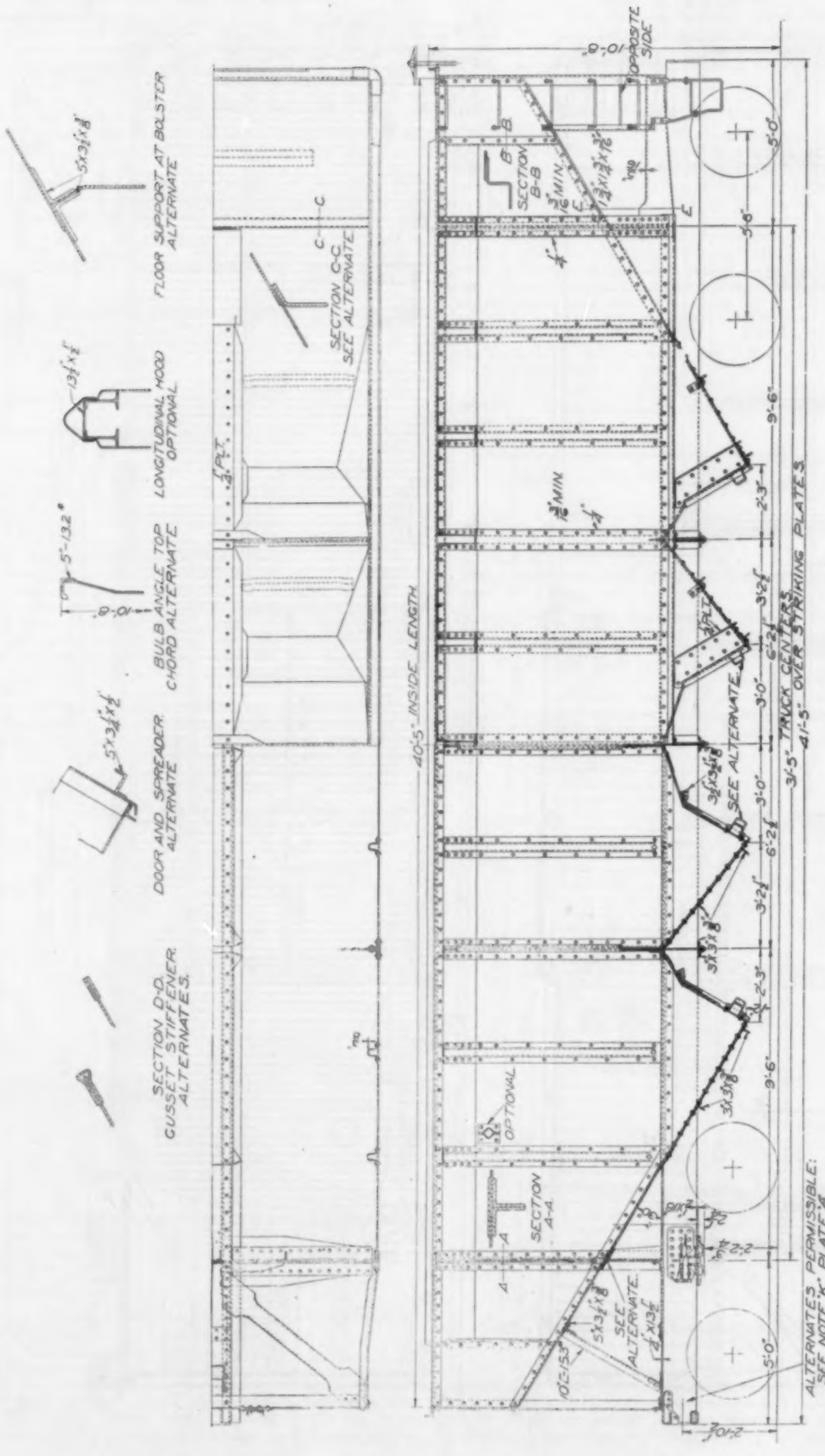
The subcommittee report is signed by C. R. Harding, chairman, P. W. Kiefer, K. F. Nystrom, A. H. Fetters and B. S. Brown.

Single-sheathed and Double-sheathed Box Cars

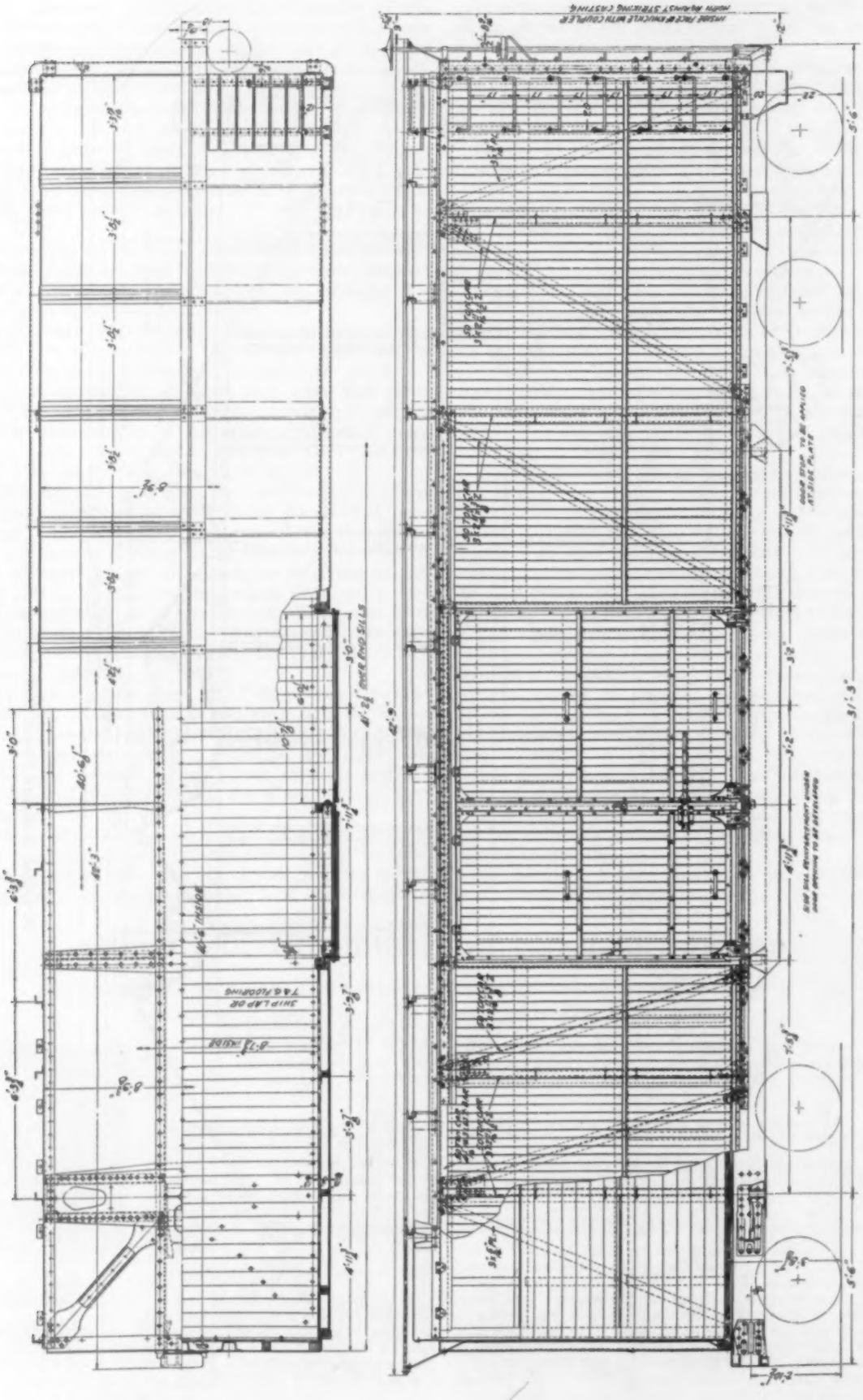
As a result of approved letters ballot drawings in the manual have been revised to cover the change from 5 ft. 0 in. to 5 ft. 6 inches overhang, and the change in width of underframe 8 feet 9 inches to 8 feet and 9⅜ inches, both types of car. A number of minor changes that do not affect the design or stresses have been incorporated in both types, these being largely the result of findings while cars were being studied under construction.

It is suggested that grain strips at side sill filler on the double-sheathed car be made optional, and the necessary note added.

Where ends are used that are supported from the corner post,



Proposed Standard 70-ton Self-clearing Hopper Car



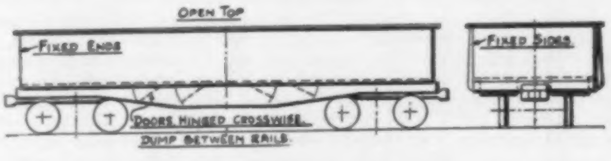
Proposed Unrestricted Automobile Car with 10-ft. 7⅛-in. Door Opening

a diagonal brace from side sill to middle of corner post should be provided, and a note to this effect will be shown.

It is thought desirable to place one of the door stops on the top door track, and one at the side sill, eliminating the present stops on the side of the car which offer a chance for leakage around the bolts through sheathing. When a bottom-supported door is used a lower stop can be placed on the door track at side sill. This is recommended in order to avoid the use of fillers and bolting through sheathing.

The retaining valve has been located in a more accessible position, permitting the use of a direct vertical retainer pipe on the end of the car.

Due to a question of patent infringement of the angle-cock holder now illustrated in the manual, it is suggested that the U-bolt be removed from the brake arrangement drawings, and



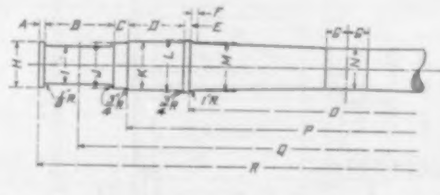
Typical Designation Diagram for Gondola Car (Class G A)

the holes be removed from the detail of the angle cock plate, and that a note "Any suitable angle cock holder may be used," be added.

The question of apparent patent infringement of the combined striking casting and front draft lug is now being developed with the Western and Eastern Railroad Associations.

The secretary has been instructed to develop with the patentees relative to apparent infringement of the Murphy and Sisson patent with reference to the portion of the patent covering steel ends with a flange on the end sheets secured to side wall structure, the flange not extending beyond side of car. Until this matter has been finally settled, we suggest that the drawings showing steel end construction, both flat and pressed plate, be marked "Patented."

The subcommittees on double-sheathed and single-sheathed box cars have co-operated in standardizing these two designs as far as practicable. As now developed, the following parts are applicable to both. Trucks, underframes, draft gears, steel ends, roof, doors, brake arrangement. There are altogether about 150 detail parts, exclusive of truck details, which can be used on both cars.



Classification of Axle	Size of Journal	Dimensions																	
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
A	3 3/4"×7"	5/8"	7"	2 5/8"	2 1/16"	13/16"	53/64"	1 1/2"	4 3/4"	3 3/4"	4 3/4"	5 1/8"	5 1/2"	4 7/8"	4 1/4"	3'-9 1/4"	5'-3"	6'-3"	6'-11 5/8"
B	4 1/4"×8"	5/8"	8"	2"	2 1/16"	13/16"	53/64"	1 1/2"	5 1/4"	4 1/4"	5 1/4"	5 3/4"	6 1/8"	5 3/8"	4 3/4"	3'-9 1/4"	5'-3"	6'-3"	7'-0 1/4"
C	5"×9"	5/8"	9"	2"	2 1/16"	13/16"	53/64"	1 1/2"	6 1/4"	5"	6 1/8"	6 1/2"	6 7/8"	6 3/8"	5 1/8"	3'-9 1/4"	5'-3"	6'-4"	7'-2 1/2"
D	5 1/2"×10"	5/8"	10"	2"	2 1/16"	13/16"	53/64"	3"	6 5/8"	5 1/2"	6 5/8"	7"	7 3/8"	6 3/4"	5 5/8"	3'-9 1/4"	5'-3"	6'-5"	7'-4 1/2"
E	6"×11"	7/8"	11"	2 1/4"	2 3/8"	1 3/4"	3/4"	3"	7 1/4"	6"	7 1/4"	7 5/8"	8"	7 3/16"	6 1/16"	3'-5 3/4"	5'-2 1/2"	6'-6"	7'-6 3/4"
F	6 1/2"×12"	7/8"	12"	2 1/4"	2 3/8"	1 3/4"	3/4"	3"	7 3/4"	6 1/4"	7 1/2"	8 1/4"	8 1/2"	7 5/8"	6 3/4"	3'-5 3/4"	5'-2 1/2"	6'-7"	7'-8 3/4"

Revised Axle Drawing

The subcommittee report is signed by O. S. Jackson (chairman) and J. Purcell, committee on Double-sheathed Box Car; and by C. R. Harding (chairman) and B. S. Brown, Committee on Single-sheathed Box Car.

Stock Car

In 1927 we presented two cuts, one showing a general arrangement of the car, the other an arrangement of the side door. We were later instructed to prepare complete designs of the stock car for insertion in the supplement to the manual, but since the width of the underframe for the single- and double-sheathed box car has been changed and the center plate relocated, moving the trucks back 6 in. farther from each end of the car, it requires the revision of a number of drawings and the preparation of some new ones. Many of the drawings of the single-sheathed box car will be common to the stock car. As soon as the work in connection with the single- and double-sheathed cars is completed, the stock car will receive the necessary attention and drawings will be completed during the ensuing year.

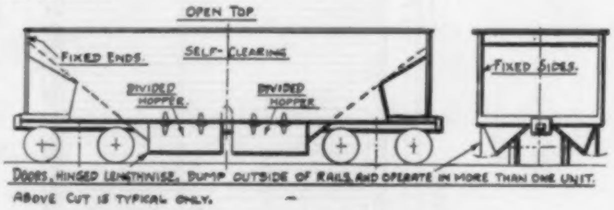
The report of this subcommittee is signed by C. R. Harding, (chairman) and B. S. Brown.

Hopper Car

Instructions given your subcommittee were to proceed with the designs of the 4 D (50-ton) and 4 E (70-ton) self-clearing hopper cars, as follows: That as many A. R. A. standards as possible be adhered to; the capacity to be figured on 52 lb. per cu. ft. weight of lading; 2500 cu. ft. for the 50-ton, and 3000 for the 70-ton cars to be figured with an average heap of 10 in.; and to be as wide as adopted clearances will allow.

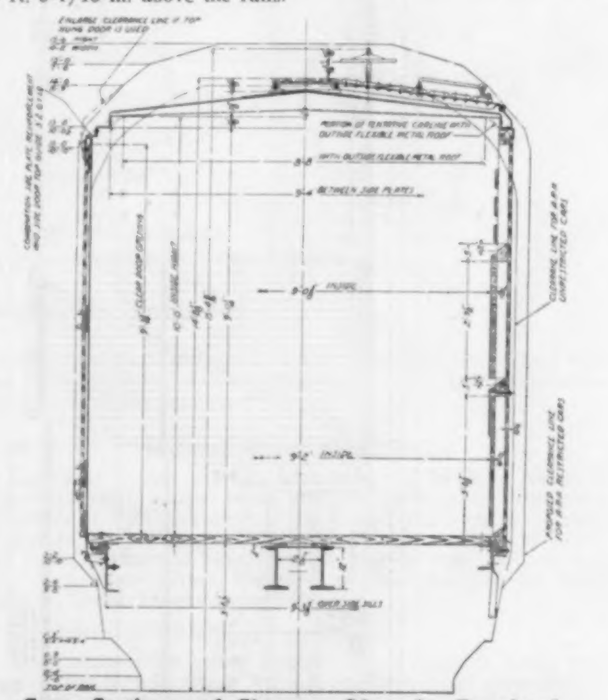
As a result of these instructions, cars covering both designs were presented in the 1926 report. During the discussion at that convention the question of length and height of car was raised, and it was later decided by letter ballot to increase the height of cars from 10 ft. 6 in. to 10 ft. 8 in. and decrease the inside length from 34 ft. 9 in. to 34 ft. 2½ in. for the 50-ton and from 41 ft. 3 in. to 40 ft. 5 in. for the 70-ton car, the cubic capacity remaining the same as before.

Your subcommittee therefore presents for consideration preliminary designs for 50-ton and 70-ton hopper cars along the above lines.



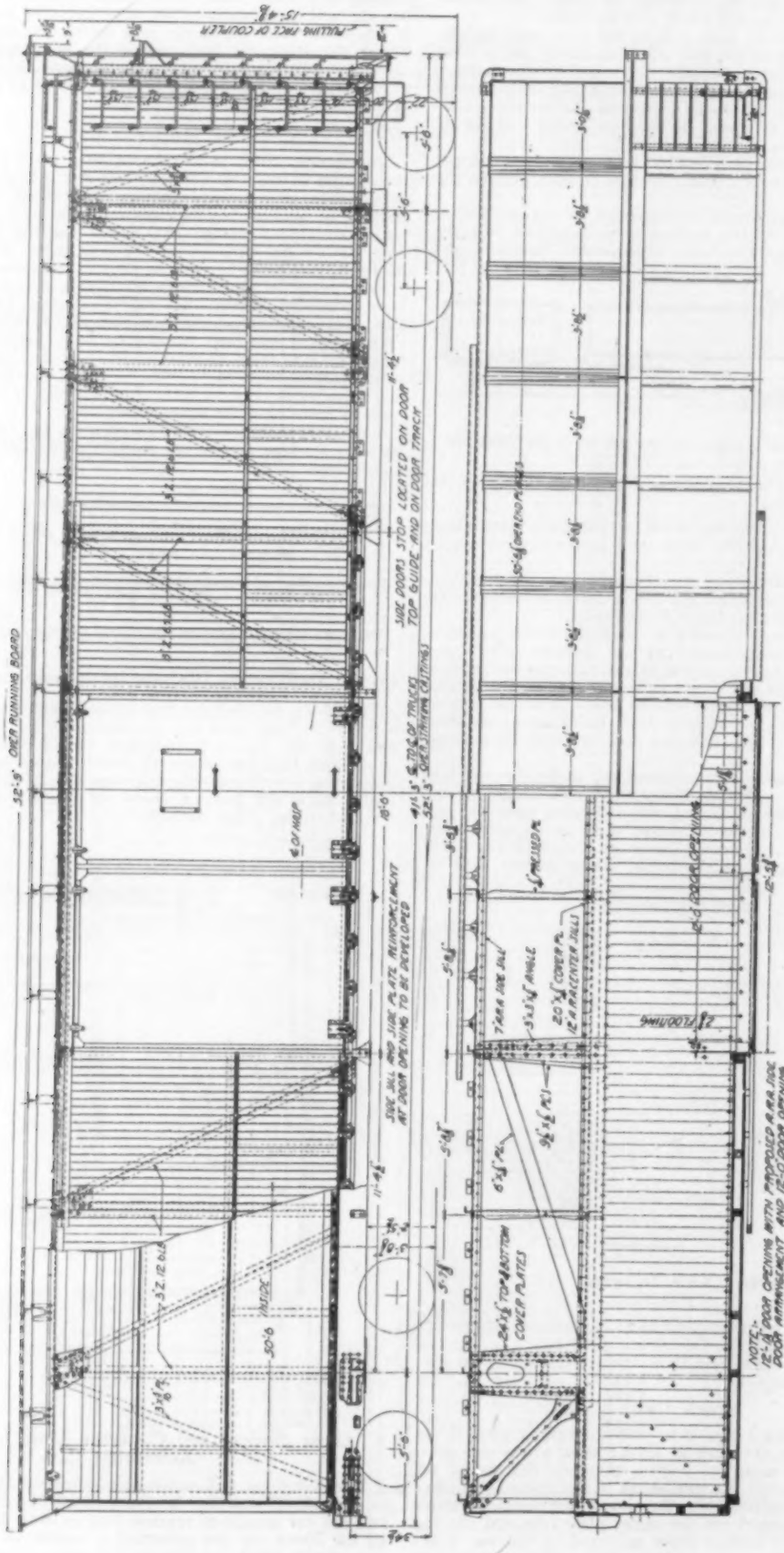
Typical Designation Diagram for Hopper Car (Class H D)

The 70-ton car contains four hoppers with the two center bays 6 ft. 2½ in. long, each bay containing 500 cu. ft. By the elimination of one bay, a three-hopper car of 2500 cu. ft. capacity is obtained thus permitting all details except longitudinal members being interchangeable and standard to the two cars. The loaded cars will have a center of gravity of approximately 6 ft. 5-1/16 in. above the rails.



Cross Sections and Clearance Lines for Restricted Automobile Cars

The 70-ton car will weigh approximately 51,250 lb. with 3/16 in. side sheets and have a revenue load of 159,000 lb. or a ratio of light car weight to revenue load of 1 to 3. On the drawing of the 70-ton car are presented a number of alternate designs, and several details are indicated as being optional.



Proposed Restricted Automobile Cars, 50 ft. 6 in. in Length and 12-ft. Door Opening

The 50-ton car is of the same general design as the 70-ton, but has one bay or hopper omitted. This car light will weigh approximately 44,000 lb. and when loaded to 169,000 lb. on rail the revenue load will be 125,000 lb. or 62.5 tons rather than 50 tons as the car is nominally described. The ratio of light weight to revenue load is 1 to 2.84.

These cars are submitted for vote of the Association as to whether this general design is acceptable. Such acceptance carries with it the obligation to complete the designs in detail.

The subcommittee report is signed by W. B. Whitsitt (chairman) and B. S. Brown.

Refrigerator Cars

Based upon the cross-section submitted last year, a design has been developed using the same underframe as the recommended practice box cars and following closely the superstructure framing as used on the double-sheathed box car.

During the past year the railroads represented on this subcommittee have built cars from this design and during the construction of these cars certain modifications were made, with the change in overhang and width of underframe agreed upon by the Association. Sketches showing the general construction of this car have been sent to members of the Car Construction committee for criticism and suggestions.

Your subcommittee suggests, that after an agreement has been reached on the design, enough drawings to show the general construction be submitted to the Refrigerator Car Owners' Organization for criticism and suggestion before detail drawings are developed.

The report of the subcommittee is signed by A. H. Fetters, (chairman); J. T. St. Clair and C. R. Harding.

Cast-steel Truckside Frames

Results of tests of A. R. A. and U. S. R. A. standard side frames, presented at the 1927 meeting, indicated that both designs are satisfactory for general service, but also indicates that the A. R. A. design could be made still stronger at the junction of the tension and compression members without appreciable increase in weight or cost. The committee stated it would undertake to develop this feature.

Since that report there has been active development in truck side-frame designs, most of which use A. R. A. standard axle center distance and employ a cross-section of tension and compression members similar in general to that used in the A. R. A. designs. Some designs, however, cannot conform to standard dimensions, such as brake hanger-pin location, bolster fit, spring plank application, and also differ in other details. Some cars built during the past year have been equipped with truck side frames whose strength properties considerably exceed those called for by the present A. R. A. specification.

The Car Construction committee has carefully considered these developments and it appears that best interests will be served by revising the A. R. A. truck side frame specification upward to take advantage of manufacturing developments and at the same time remove from the manual the detailed side frame designs and replace them with the diagram submitted with this report which prescribes axle spacing, clearances, and other dimensions, which it is desired to maintain standard if possible without prescribing the detailed construction of the frames themselves.

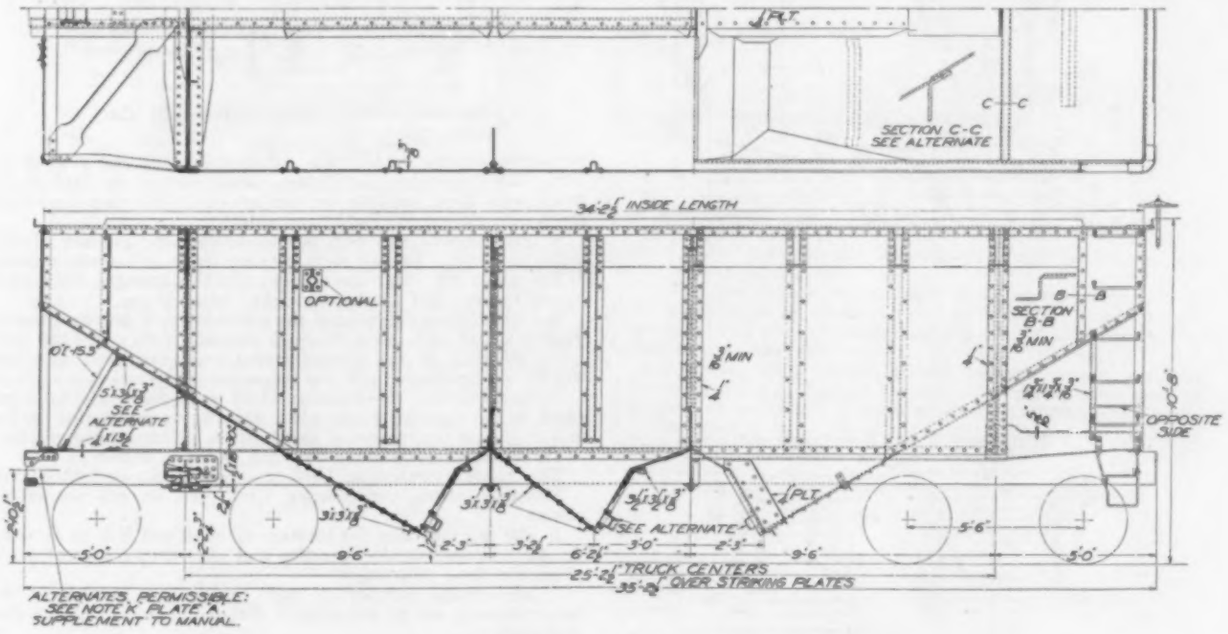
The Car Construction committee has requested the committee on specifications to revise the specifications for new cast steel truck side frames and to include a clause that any new truck side frame made of T, I-beam, or angle section, will not be considered as meeting the requirements of the specifications.

This clause is intended to permit reasonable latitude to manufacturers and engineers in developing new designs, but at the same time to prevent the use of sections which have been found in the past to be unserviceable.

The subcommittee report is signed by J. J. Tatum, (chairman); John Purcell and A. R. Ayers.

Truck Springs

The Committee has had before it for the past few years the question of truck spring capacity for cars of 50 tons capacity or greater. The co-operation of the spring manufacturers has been sought and attention is also being given to various arrangements of springs, friction cushions, etc., designed to provide adequate capacity for truck springs of cars of heavy capacity. Road tests are being made and it is expected that some definite information will be available next year.



Proposed Standard 50-ton Self-clearing Hopper Car

Journal Boxes and Details

Last year certain changes were approved by letter ballot in connection with journal boxes and journal wedges. Since then, members of the Committee on Car Construction and also manufacturers have recommended slight alterations. The committee on Car Construction has approved these changes, but, as they are of a minor nature, they will not be submitted for letter ballot. These changes are as follows:

Journal Boxes

1—Distance from center line of box to lugs on inside roof of box has been increased from ¾ in. to ⅞ in. in order that all types of lids now on the market could be employed.

2—Lugs in the side of the box for eliminating wedge movement have been made a flat surface in place of coring out.

3—A section has been added to each journal-box drawing showing an optional design of fillet at the upper corners. Some manufacturers prefer this construction in order to obtain clean castings.

4—Jacking bosses have been applied to all boxes.

Journal Wedges

1—An additional view has been added to show a permissible alternate construction. This action was taken on account of manufacturers making wedges by the drop-forged method finding it difficult to comply with the recommendations which were approved by letter-ballot last year. The permissible alternate design reduces the cost of manufacturing.

2—The dimension "E" for the 3¼-in. by 7-in. wedge has been changed from 3¼ in. to 4 in. Change was recommended to provide more metal at the lower edge of wedge and does not affect interchangeability.

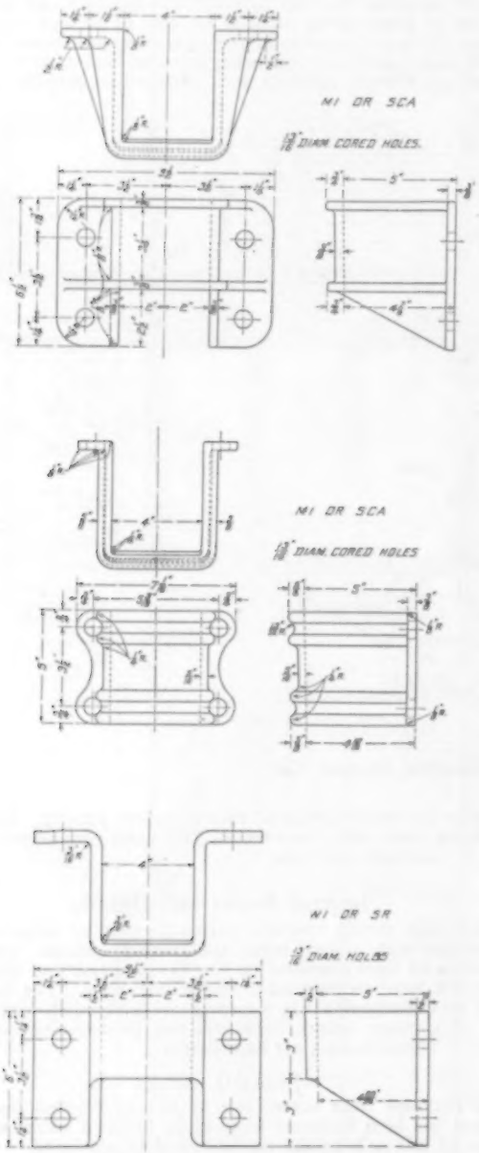
The above revisions will appear in the revised sheets in the manual.

[Revised drawings of journal boxes and wedges which accompanied the report are not reproduced.—Editor.]

Subcommittee report on journal boxes is signed by K. F. Nystrom.

Jacking Boss for Journal Box

The committee has received several suggestions that jacking boss, similar to that shown for integral boxes, be added to the

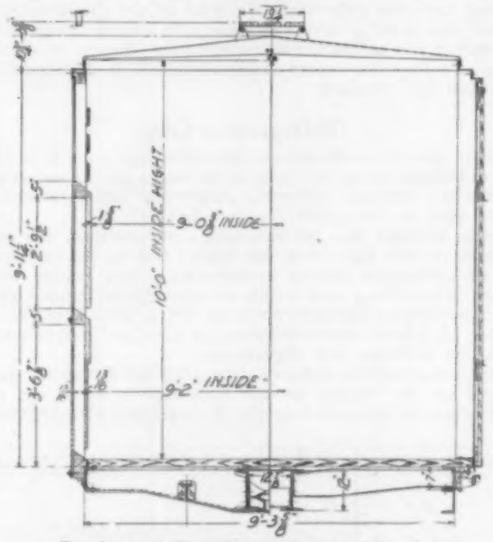


Recommended Standard Stake Pockets

drawings showing separate journal boxes. As this is a minor change and has been approved unanimously by the committee the secretary has been instructed to change the drawings in the manual and the matter will not be submitted to letter ballot.

Platform Safety Chains for Passenger Equipment Cars

Attention has been called to the lack of uniformity in locating platform safety chains, some roads having the chain, with hook, on the left side and some on the right. The recommended prac-



Section of Restricted Automobile Car

tice covering this subject was adopted in 1893 and revised in 1896. This provides that "when facing end of car, the chain fitted with hook shall be on the left-hand side and the chain fitted with eye on the right-hand side."

A questionnaire was sent out to develop the practice of the individual lines. Replies were received from 101 roads owning 57,210 passenger cars, there being 69,317 passenger train cars owned by the Class I railroads in the United States.

The questionnaire developed the following: Thirty-two roads, owning 21,318 cars, have the hook located on the left-hand side when standing on the ground facing end of car, or, in other words, in accordance with the recommended practice.

Forty-six roads, representing 22,408 cars, have the hook located on the right-hand side when standing on the ground facing end of car, or the reverse of the A. R. A. recommended practice.

Three roads, representing 689 cars, failed to answer.

Two roads, representing 1,648 cars, have hooks on both chains.

Seventeen roads, representing 1,157 cars, do not use safety chains.

It will be noted that the location of hook and link as between A. R. A. recommended practice and the reverse thereof is in about the same proportion.

A considerable number of roads, including a number of the large systems, are of the opinion that the chains should be discontinued.

It is recommended that where platform safety chains are used, the hook and link be located in accordance with the recommended practice of the Association.

Method of Attaching Brake Beams to Side Frames

An approved method of brake-beam suspension has been developed, referred to letter ballot and passed. The design will be incorporated in the manual, including the hairpin cotter, the use of which has been assigned to the Association by the patentees.

During the forthcoming year, the committee will develop jointly with the Arbitration Committee, rules pertaining to the limit of wear on hangers, pins, and brake heads.

The subcommittee report on attaching brake beams is signed by A. H. Fetters (chairman), K. F. Nystrom and I. Everett.

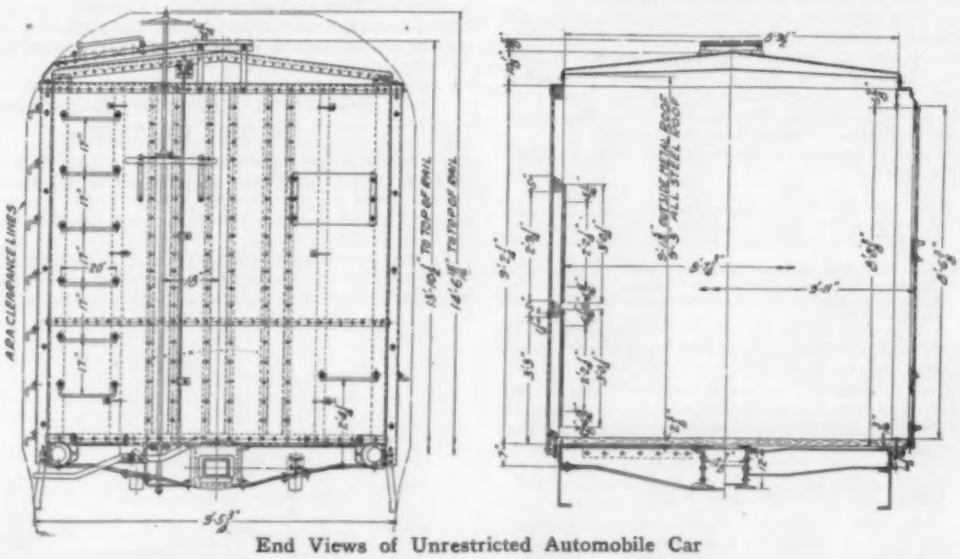
Lumber Sections

At the American Lumber Congress in 1919, steps were taken to inaugurate simplification and general standardization of lumber sizes and grades. The purpose being to promote greater convenience and economy and to eliminate waste.

A central committee on lumber standards was formed and presented a report on simplification of lumber grades and standardization of lumber sizes. Your committee was invited to participate in this work in connection with lumber sizes and grades for car construction purposes and has been represented by John Foley, assistant to purchasing agent, Pennsylvania Railroad. As

a result of conferences and a study of the car sections proposed by the Central Committee on Lumber Standards your committee reports as follows:

Before action is taken, the new sections should be issued as permissable alternates to the present A. R. A. standard lumber sections for a period of one year, during which time roads should obtain prices on the proposed lumber sections, as well as for the present standard sections, so that at the end of the year they will know whether or not enough money is saved by using the proposed sections to justify the change from existing standards.



End Views of Unrestricted Automobile Car

During the year the proposed standards should be permissable for maintenance and new cars. In all cases the moisture content specification should be followed.

The new sections agree with the sizes and workings of the American Lumber Standards which have become effective during 1925, 1926, and 1927 for yard lumber used in building construction, and it is contended by the manufacturers that the adoption of these sections by the railroads will result in economy on account of mass production.

The proposed revised lumber sections have less face width than the present A. R. A. standards by the following amounts:

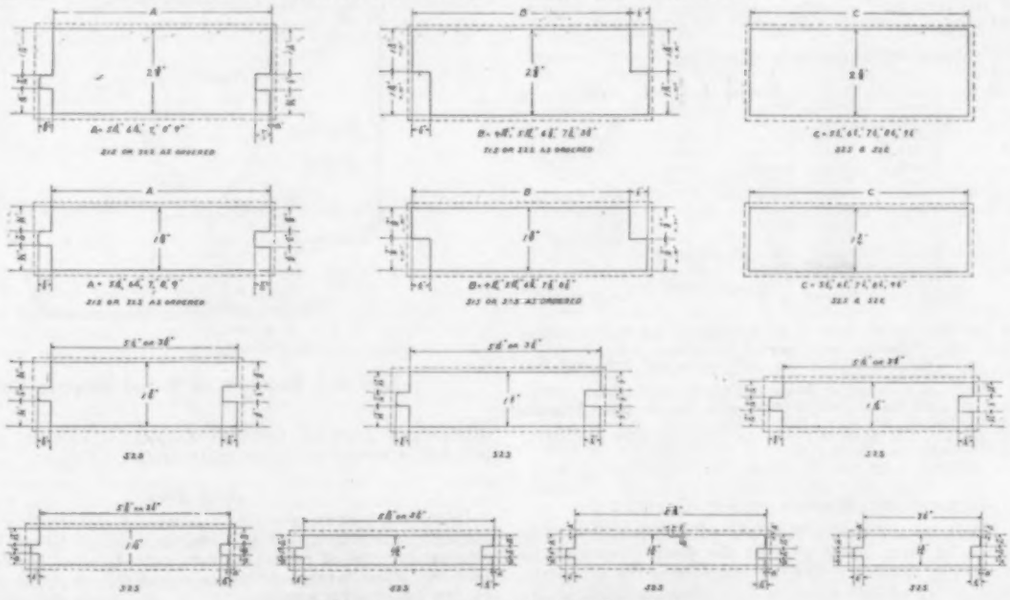
It is claimed that these differences in widths are largely due to the more severe restrictions imposed by the specification for moisture content recently adopted by the Association. Other differences are of a minor nature, such as making an offset for insuring a tight fit at the groove, curving the edge of the tongue, etc.

Stake Pockets for Flat Cars

In compliance with suggestions from the Arbitration committee and Committee on Loading Rules, three designs of stake pockets were developed and are submitted herewith for adoption as recommended practice.

Two of the designs are castings to be of malleable iron or steel, one secured by rivets and one by U-bolts. The other design may be of iron or steel plate and riveted to a steel sill or bolted to a wooden sill.

In preparing these designs it was assumed that a width of 4 in. and a depth of 5 in. at the top of the pocket conformed to the intent of paragraph 2, section "f" of Interchange Rule No. 3. The taper is ⅜ in. in 12 in. as recommended by the Committee on Loading Rules.



Standard Sections for Car Lumber

For square edge flooring ¼ in. for narrow sections to ⅓ in. for wide sections; for shiplap lumber with ½ in. lap—5/16 in. to ⅜ in.; for siding and tongue and groove flooring with ⅜ in. tongue—3/16 in. to ¼ in.; and for tongue and groove siding, roofing and sheathing with ¼ in. tongue—0 in. to 1/16 in.

The subcommittee report on stake pockets is signed by A. R. Ayers.

Definition and Designating Letters for Cars

Your subcommittee recommends for approval changes and additions as follows:

Class "H"—Hopper Car Type—In order to convey a description of its construction and adaptability for loading and unloading, diagrams covering 12 types of hoppers and hopper doors are submitted to illustrate the physical characteristics of cars as now given in the five definitions of the Railway Equipment Register.

Class "G"—Gondola Car Type—Diagrams covering 14 types of gondola cars are submitted to illustrate the characteristics and provide for types not now shown in the nine definitions of the Railway Equipment Register. If approved, the 25 diagrams will be published in the Railway Equipment Register.

Hopper cars having open top with fixed sides and ends, and bottom consisting of longitudinal doors arranged to dump either outside or inside of rails or both, self-clearing, appear to have no classification. This type of car is constructed for ballast service, and even if it is the intention to use car in revenue service at times, it could properly be classified under the designation "M. W. B." and your committee so recommends.

Passenger Cars—Your committee recommends changing definitions to read as follows:

"DB"—Buffet Car. Car for the transportation of passengers and fitted with small broiler or buffet to serve simple meals to passengers, cooking and serving done on removable tables by regular porter in charge of car.

"DC"—Cafe Car. A car fitted with kitchen, usually in center of car, one end used as cafe where meals are served, smoking allowed, the other end of car fitted with either regular dining room or smoking and card room; carrying cooks and waiters.

The report of the subcommittee is signed by Ira Everett (chairman), C. E. Adams and R. B. Rashbridge.

[The report gives present and proposed text for Class H and Class G cars with diagrams for each designation. Only typical diagrams are given here and characteristics are shown in tabulated form.—EDITOR.]

Class "H"—Hopper Car Type

Designation Old	Designation New	No. Doors Hoppers	Hinged	Operated	Dumps
HD		2 or more	Lengthwise	Independent	Outside
	HDA	2 or more	Lengthwise	Single Unit	Outside
HE*		2 or more	Crosswise		Between
HF		2 Center	Crosswise		Between
		2 End	Lengthwise		Outside
	HFA	2 Center	Lengthwise	Single Unit	Out or in
		2 End	Lengthwise		Outside
	HK	2 or more	Lengthwise	Single Unit	Out or in
HM		2	Crosswise		Between
	HMA	2	Lengthwise	Independent	Between
	HMB	2	Lengthwise	Single Unit	Between
HT		3 or more	Crosswise		Between
	HTA	3 or more	Lengthwise	Independent	Between
	HTB	3 or more	Lengthwise	Single Unit	Between

All hopper cars are open top, fixed sides and ends and have divided hoppers.

Classes HF and HFA have end hoppers in addition to center hoppers.

*All are self clearing except Class HE, which has level bottom at ends.

Class "G"—Gondola Car Type

Designation Old	Designation New	Sides	Ends	Bottom	Doors	Service
GA		Fixed	Fixed	Drop	Cross.	
GB		Low Fix.	Fixed	Solid		Mill
GD		Doors	Fixed	Solid	Side	Coal
	GDA	Doors	Fixed	Solid	Side	Not Coal
GE		Fixed	Drop	Drop	Cross.	
GH		Fixed	Drop	Drop	Center	
GK		Fixed	Fixed	Solid		Mill-Coal
	GKA	Fixed	Fixed	Solid		Coal only
GM		Low Fix.	Drop	Solid		Mill
	GMA	Fixed	Drop	Solid		Mill-Coal
	GR	Fixed	Fixed	Hopper	Cross.	
	GRA	Fixed	Fixed	Hopper	Long.	
GS		Fixed	Fixed	Drop	Center	
GT		High Fix.	Fixed	Solid		Coal Dumper

Classes GB and GM are for mill trade only and do not have sufficient cubic capacity to carry "Marked Capacity" of bituminous coal.

Classes GK and GMA are suitable for mill trade and have sufficient cubic capacity for bituminous coal.

Class GKA has inside gussets and is not suitable for mill trade.

Classes GR and GRA have level bottoms with one or more hoppers. Class GR dumps between rails and GRA outside.

Classes GA, GE and GR dump between the rails. Classes GD, GDA, GH, GRA and GS dump outside of rails.

Dimension Markings for Cars

On some late types of cars which use of a Z-bar side plate there appears to be some doubt whether the dimensions shall be taken at the upper or lower edge of the structure at the side plate.

The question is which dimension will be more valuable in determining whether or not a car may pass various clearance lines or whether some other dimension, such as, widest part of car at certain heights, is preferable.

This is now in the hands of a subcommittee which has made some recommendations and will make further study in order that definite action may be taken at the next meeting of your committee.

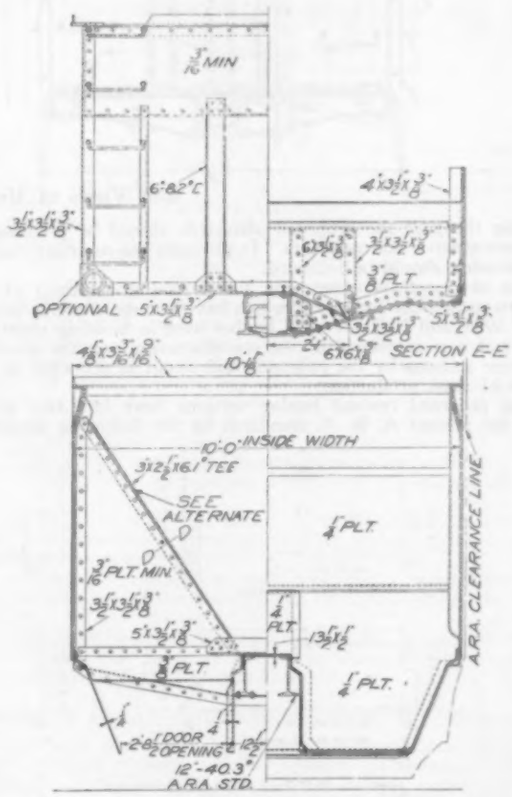
Axle Wheel Seat

The Arbitration Committee has been considering for some time the matter of controversies arising in repairs to cars in interchange account of differences in recording diameters of axle wheel seates. These differences it is felt are largely due to the difficulty of properly calipering wheel seats because wheels in many cases are mounted against the shoulder of wheel seat. To overcome this difficulty the Wheel Committee feels that no hazard will be involved if the wheel seat is increased in length ⅛ in. and the collar moved toward the center of the axle accordingly. Your committee is in accord with the proposed change and recommends that it be adopted. If approved, the axle drawing the manual will be revised as shown in figure herewith.

Recommendations for Maintenance of Arch Bar Trucks

It may be definitely stated that the majority or arch bar failures are due to improper construction or maintenance. If the various parts of arch bar truck side frames are loose or not in proper contact the safe side frame will not function as a truss, as it is designed to do, and concentration of load on certain parts may result in overstressing and subsequent failure.

[Accompanying the report were four illustrations showing improperly formed or sprung arch bars and loose bolts, also two



End and Sections of 70-ton Hopper Car

illustrations showing typical examples of column and journal box bolt removed from defective trucks.—Editor.]

Arch Bars

Interchange rules are now before the Arbitration Committee for approval which will provide, for 40 and 50-ton trucks, two alternative sizes of arch bars that must be used for replacement. One size gives increased thickness and the other increased width as compared with previous A. R. A. standards. It is recommended that wherever possible arch bars of increased width be used for replacement as this gives greater sectional area and does not materially decrease the flexibility of the arch bars.

A. R. A. rules permit arch bars to be made of wrought iron or mild steel. It is recommended that all bars be made of material equal or better than that called for by A. R. A. specifications for wrought iron and mild steel bars.

All arch bars should be bent hot and be accurately formed at the bends so as to give proper contact between arch bars, journal box and column castings.

Column and Journal Box Bolts

If wear occurs the parts must be loose so that generally speaking, wear is primarily the result of loose bolts. The same is also true with shear and tight bolts will eliminate or materially reduce bolt shear. Material should be the same as that used for arch bars.

All box and column bolts should be of full size and a good fit in the holes in arch bars, journal boxes and column castings. In particular, holes in arch bars should register accurately and not be cut out of round by drilling, reaming or burning with the oxy-acetylene torch in order to make the holes in the various members line up to permit the insertion of bolts. Threads on bolts and nuts should be cleanly cut and free from torn metal. Excessive slack between the threads of bolts and nuts should be avoided. Bolts should be threaded only a sufficient distance to permit proper engagement with the nut so as to leave the unthreaded portion in contact with tie and arch bar. It will be noted from the

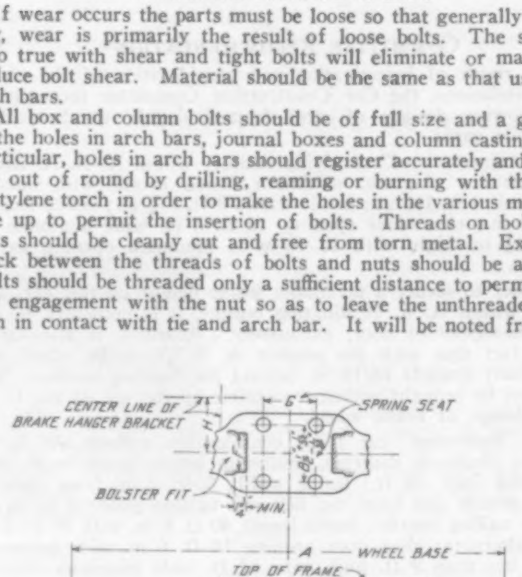


TABLE OF DIMENSIONS AND TOLERANCES				
	2C FRAME 5"X9" JOURNAL	2D FRAME 5½"X10" JOURNAL	2E FRAME 6"X11" JOURNAL	TOLERANCES
A	5'-6"	5'-6"	5'-0"	+3/16 −1/8
B	13"	13"	17"	+1/8 −0
C	16"	16"	20"	+1/4 −0
D	11 1/8"	11 7/16"	12"	+1/4 −0"
E	14 7/8"	14 7/8"	15"	+1/8 −1/8
F	5 1/2"	6"	6 1/2"	+1/16 −1/16
G	8"	8"	12"	+1/32 −1/32
H	8"	8 1/2"	9"	+1/16 −1/8
J	10 1/2"	10 1/2"	11 1/2"	+1/4 −1/8
K	5/16"	3/8"	7/16"	

NOTE-1: INSIDE DIMENSIONS OF JOURNAL BOX AND CONTAINED PARTS MUST CONFORM TO A. R. A. STANDARDS.

NOTE-2: THE SIDE FRAME MUST CONFORM TO THE A.R.A. SPECIFICATIONS FOR STRENGTH.

NOTE-3: ALTERNATE DESIGNS INVOLVING NON-STANDARD BOLSTER, SPRING PLANK OR SPRING ARRANGEMENT WILL BE PERMISSIBLE PROVIDING THAT THEY CONFORM TO A.R.A. SPECIFICATIONS FOR STRENGTH AND THE TRUCK AS A WHOLE MEETS THE A.R.A. REQUIREMENTS FOR INTERCHANGEABILITY.

Proposed Standards for Cast Steel Truck Side Frames

illustrations that nearly all bolts had been threaded too much, bringing the worn portion on the thread. A. R. A. drawings show three alternate methods of adding to the shear value of the arch bar connections above the journal box and the proper use of one of these alternates will greatly assist in eliminating bolt shear.

Column Castings

These may be of cast steel or malleable iron. A. R. A. recommendations should be carefully followed as regards bearing area of column casting against column bolts. This is essential to minimize wear and insure tightness of connections as there is considerable reaction due to brake applications that must be taken by the column casting. The bend of the arch bar at the column casting fit should not be covered by side lugs on column castings or by gibs, this to insure proper contact and facilitate inspection.

Assembly—While all bolts should be securely tightened, the use of excessively long wrenches should be avoided. An average man with an 18 in. wrench can stress 1⅛ in. journal box bolt up to 10,000 lb. per sq. in. and longer wrenches than this should not be used for 1⅛ in. and 1¼ in. bolts. For 1⅜ in. and 1¾ in. column bolts, wrenches longer than 4 ft. should not be used. This is to avoid stretching of the bolts, as an average man with a 5-ft. wrench can stress a 1⅛ in. or 1¼ in. bolt considerably above the elastic limit of both grades of standard A. R. A. material specified for arch and column bolts.

The above recommendations are intended to emphasize the necessity of providing for proper maintenance of existing arch bar trucks. The Car Construction Committee strongly recommends that the use of old or reconditioned arch bar trucks under new car bodies should be discouraged.

The subcommittee report is signed by W. A. Newman, (chairman), C. B. Smith and J. McMullen.

Report on Automobile Cars *

Supplementing the 1927 report, the subcommittee appointed to investigate requirements of the automobile industry, accompanied by members of the National Automobile Chamber of Commerce, visited a large number of automobile plants and body manufacturers and developed the following information:

The 23 plants visited have been grouped as follows in accordance with their car construction and door opening requirements.

Group A—Manufacturers whose requirements will not exceed the A. R. A. "unrestricted" interchange dimensions with 10 ft. clear side door width. Average monthly shipments represented, 35,446 carloads.

Group B—Manufacturers requiring a car of "unrestricted" dimensions with side door width in excess of 10 ft. Average monthly shipments represented, 1,683 carloads.

Group C—Manufacturers requiring "restricted" car width or height with side door width of 10 ft. Average monthly shipments represented, 10,020 carloads.

Group D—Manufacturers requiring end door cars.

(1) "Unrestricted" car dimensions will provide sufficient end door clearance for commercial machines. Average monthly shipments represented, 1,418 carloads.

(2) "Restricted" height and width dimensions required to obtain maximum end-door clearance for commercial machines. Average monthly shipments represented, 551 carloads.

Total for (1) and (2) under Group D, 1969 carloads.

The following outstanding facts and conclusions may be drawn from the report:

An auto car in accordance with A. R. A. "unrestricted" dimensions and equipped with staggered 10-ft. side doors having opening 8 ft. 6⅛ in. in height will meet the requirements of the majority of the automobile shippers.

Some demand exists for cars of 50 ft. 6 in. inside length for transcontinental shipments. This demand is apparently being taken care of by some western roads.

There is some demand for door widths in excess of 10 ft. This is small however, when considering the requirements of the automobile industry as a whole and is reflected by the fact that of the 23 manufacturers covered, five, or 21.7 per cent require side doors in excess of 10 ft. in width. Stated in another way, manufacturers visited represent 49,118 carloads per month and those requiring side door in excess of 10 ft. represent 1,683 carloads per month or 3.4 per cent. Two large automobiles are loaded single-decked in 36 ft. cars, therefore the question of height and width in excess of A. R. A. "unrestricted" dimensions is not involved with the question of wide doors.

Industries visited and requiring the 12-ft. side-door are loading passenger autos of extreme dimensions single-decked and therefore do not require the high and wide car. Of the shippers who need wide side door openings but whose requirements may be met with the "unrestricted" car, 2.05 per cent of the shipments require 10-ft. 6 in. door openings; .08 per cent, 11-ft. and 1.31 per cent, 12-ft. openings.

There is now a tendency toward the production of smaller automobiles, except commercial cars, from which it appears that the demand for door widths in excess of 10 ft. is at its maximum at present.

For the large auto car for "restricted" service, it is advisable to provide side door openings of maximum height consistent with strength of structure. Large steel automobile bodies are loaded standing on end, and to accommodate these shipments, a door opening height of 9 ft. 2 in. is submitted for consideration. Shipments from body manufacturers requiring auto cars to the "restricted" width and height dimensions but not requiring side door widths in excess of 10 ft. account for 10,202 of a total of 49,118 carloads per month, or 20.4 per cent, based on plants visited.

Apparently there are no established limits as to the dimensions for the various types of commercial automobiles and for this reason, maximum end door widths and heights obtainable are desired. The total end door shipments as covered in paragraphs (1) and (2) under Group D amount to 1,969 or 4 per cent of a total of 49,118 carloads per month.

* *Note.*—The word "unrestricted" used hereinafter refers to cars lying entirely within the limiting outline for freight cars, Plate "B" of the manual. Such cars are subject to only a few restrictions and these apply only at a few points on a few roads around most of which are optional routes. A. R. A. double wood sheathed steel frame auto car lying within these limits has inside length 40 ft. 6 in., width 8 ft. 7¾ in., and height 9 ft. 3 in.

The word "restricted" refers to A. R. A. design of wood double-sheathed steel-frame auto car having inside width 9 ft. 2 in. and height 10 ft. 0 in. This design lies considerably outside of the limiting outline for freight cars and is subject to certain operating restrictions.

Suggestions for Building Wide Side-Door and End-Door Box Cars

Following this survey, the National Automobile Chamber of Commerce submitted the following:

Dimensions—40 ft. 6 in. or 50 ft. 6 in. length, with inside height at least 10 ft. in the clear at the eaves and inside width 9 ft. between rails. This width is necessary for body loading.

Side Doors—Openings 10 ft. or 12 ft. in the clear, staggered. It is important that side doors should be of full width in the clear. The 12-ft. side door will accommodate all types of automobile loading which uses side doors. There appears to be no objection to using a 6-in. or 8-in. header at the top, leaving the door opening at least 9 ft. in the clear, if such reinforcement is deemed necessary.

The Camel Company has devised strong, improved, double side doors with movable door posts that hold doors locked rigidly, making them grain tight and providing an "all-purpose" car.

End Doors—We suggest that 35 per cent of all new cars be built with end doors for the increasing movement of motor buses, trucks, ambulances, hearses, fire apparatus, and passenger automobiles of long wheelbase. Dimensions of end-door openings should be 8 ft. 10 in. wide and 9 ft. 10 in. high in the clear to accommodate the larger buses and trucks.

The Camel Company has designed a steel end door with movable door post principle, which is as strong as the side of the car. These cars are suitable for lumber or other heavy freight which might cause an unusual strain upon the end. Transcontinental roads have adopted it in order to make their cars available for return hauls.

Belt Rail or Wooden Girth for Nailing Purposes—This should be not less than 2 in. commercial thickness, regardless of sheathing. It should began at a point 30 inches from the floor and continues upward 56 inches, making the highest nailing point 86 inches from the floor.

Center Lifting Devices at Ridge Pole—The inverted T-bar has been improved upon. Some new cars have an I-beam with a small portable crane. A late development is that of the Hutchins Car Roofing Company, which is placing a section of carline channel inverted under the ridge-pole with 2½-in. clearance between. This channel may run the full length of the car or in sections properly located. This device provides two inches additional height in the center of the car as compared with the inverted T-bar. Another advantage is the 2½-in. clearance between it and the ridge-pole, permitting the use of the so-called "ice-tong" chain fall at any point, or rope, chain or wire can be wrapped around it for use with the "hook" chain fall. This permits a direct pull, desirable in loading and unloading automobiles. The device is inexpensive and not patented.

Loading and Unloading Devices at Eaves—The Hutchins Company has worked out another idea here, placing a "stirrup" or "loop" on each carline at the eaves and between the carlines on the side plate. We have recommended two stirrups or ing-bolts between the carlines on the side plate, as these carlines are usually three feet apart. Our idea is to provide a sufficient number of points of contact in order to give a direct pull. If the center device is installed in sections it is only necessary to provide the device at the eaves in the areas opposite the center sections.

It should be understood, however, that although these features are desirable and useful, they should be optional with carriers. We wish to emphasize the fact that these devices and reinforcements protect carriers' equipment from damage and facilitate the loading and unloading of heavy freight.

Subsequent to the receipt of the above communication, the following recommendations from the Ford Motor Company have been considered:

Ford shipment requirements are: Height 10 ft. into clear; length, 40 ft. 6 in.; width, 9 ft.; doors, 12 ft. clear. This is quite a departure from the specifications needed to handle Model T cars and is brought about through the necessity for mixing Model AA trucks and Model A passenger cars at all branches as well as Detroit.

We can get along with 10 ft. doors when shipping one truck and three or four passenger cars in some freight equipment, but when shipping two trucks we must have a 12 ft. door.

During the last year and a half of the old Model T shipping period we used a great many 10 ft. high cars in angling the cars, but this method cannot be used in Model A. It is necessary to double-deck two open models and place the closed job on the floor of the freight car.

As far as we can determine now, most of our shipments will consist of five automobiles to the car. It should be understood that most of these cars will be 40 ft. long because with the requirement of five to carload we can meet the 11,200 lb. minimum.

If we ship straight carloads of Model AA trucks, 12-ft. doors will be required, although we might get by with 11 ft. if the cars are 9 ft. wide.

Committee Recommendation

As a result of investigation and consideration of the above recommendations, the Car Construction Committee recommends the following designs of steel framed double wood-sheathed automobile cars:

(1)—"Unrestricted" car lying entirely within A. R. A. tentative clearance diagram, minimum inside height with outside metal roof, 9 ft. 1⅝ in.; inside width, 8 ft. 7¾ in.; inside length, 40 ft. 6 in.; clear door opening, 10 ft. 6 in. wide minimum by 8 ft. 6⅜ in. high, with 12 ft. wide minimum opening as an alternate.

In order to secure a maximum inside height on this car, and remain within A. R. A. limiting outline, it is necessary to use a bottom-supported door, exclusively. Attention is also called to the fact that with the present A. R. A. brake wheel, the brake shaft extends 15/16 in. beyond the limiting outline. The shaft can be brought within the outline by the use of the U. S. R. A. design of brake wheel.

(2)—"Restricted" car lying considerably without A. R. A. tentative clearance diagram, minimum inside height with outside metal roof, 10 ft.; inside width, 9 ft. 2 in. from floor to nailing boards and from top belt rail to side plate; 9 ft. ⅜ in. between nailing boards; inside length 40 ft. 6 in. with 50 ft. 6 in. as an alternate; clear door opening 10 ft. 6 in. wide minimum by not less than 9 ft. high with 12 ft. wide minimum opening as an alternate.

General drawings of the 40 ft. 6 in. "Unrestricted" and 50 ft. 6 in. "Restricted" car, also cross-section of the "Restricted" car with a tentative clearance diagram are submitted as a part of this report. The sill step arrangement shown on the drawing for the "Restricted" car shows condition that can be obtained by changing the distance from center of truck to end sill striking face from 5 ft. to 5 ft. 6 in. This same condition will be shown on the drawings for the "Unrestricted" car, single-sheathed box car and stock car when the drawings are revised.

The survey demonstrated that there is a demand for both 10 ft. 6 in. and 12 ft. clear width of side door openings, the number of cars with each width of door opening to be determined by the needs of each respective road. The 12-ft. door will add appreciably to the weight and cost of the car. End doors may be applied to any of these designs of cars, if desired.

These recommendations should be submitted to letter ballot and, if approved, your committee will develop the detail in designs.

The report of the committee on car construction is signed by A. R. Ayers (chairman), general manager, New York, Chicago & St. Louis Co.; P. W. Kiefer (vice-chairman), chief engineer motive power and rolling stock, New York Central; O. S. Jackson, superintendent motive power and machinery, Union Pacific; C. L. Meister, mechanical engineer, Atlantic Coast Line; J. McMullen, superintendent car department, Erie; John Purcell, assistant to vice-president, Atchison, Topeka & Santa Fe; W. O. Moody, mechanical engineer, Illinois Central; C. B. Smith, engineer of tests, Boston & Maine; S. O. Taylor, master car builder, Missouri Pacific; Ira Everett, chief car inspector, Lehigh Valley; W. A. Newman, mechanical engineer, Canadian Pacific; G. S. Goodwin, assistant general superintendent motive power, Chicago, Rock Island & Pacific; J. J. Tatum, general superintendent car department, Baltimore & Ohio; E. B. Dailey, engineer car construction, Southern Pacific; B. S. Brown, assistant engineer, Pennsylvania Railroad; S. B. Andrews, mechanical engineer, Chesapeake & Ohio; and K. F. Nystrom, superintendent car department, Chicago, Milwaukee, St. Paul & Pacific.

Discussion

R. L. Kleine (Penna.): I notice that the recommended practice of the Association for platform safety chains was adopted in 1893 and revised in 1896 and also, according to the record gathered by the Car Construction Committee, that the hooks and the links are sometimes reversed. I have also noticed that where a coupler fails, usually the safety chain, on account of the necessary slack in the chain, either breaks the hook or pulls off. The same thing applies to truck safety chains, and with the standard A. R. A. coupler and the increased

strength of the coupler there is less use for the platform safety chain today than ever before and it is a question whether we ought to continue them. But, as the committee puts it, it is the recommendation that where platform safety chains are used, the hook and link be located in accordance with the recommended practice of the Association and I cannot see any objection to letting it stand and leaving it optional with the railroads whether they do or do not use the platform safety chain.

G. W. McCormick (S. P.): I move that the report be accepted, with letter ballots where necessary.

(*The motion was carried.*)

Committee Report on the Lubrication of Cars

Recommendation is made that no further extensions affecting interchange Rule 66 be granted

G. W. Ditmore
Chairman

The purpose of this committee is to make an investigation of the general lubrication of railway equipment, and the major consideration is to make proposed interchange Rule 66 effective.

The committee feels that the numerous extensions of time already granted for the effective date of Rule 66 have been sufficient to provide car owners ample time to perform on their cars the work required by this rule; and recommends that no further extensions after Jan. 1, 1929, be granted.

The committee was instructed to give attention to specifications for the following: (a) Packing journal boxes; (b) lubricating oils; (c) oil reclamation, and (d) waste for journal-box packing.

The methods of packing journal boxes was first given attention by your committee, based upon the recommended practice adopted by the division in 1920.

Investigation of methods of reclaiming journal box packing and lubricating oils develops that a great percentage of so-called renovated packing was not satisfactory and practically no effort was being made to clean or renovate car oils. Analysis of some specimens of reclaimed oils in use showed samples to contain as high as 25 per cent water, 11 per cent to 13 per cent insoluble carbonic matter and ash, and so dirty that other physical characteristics could not be obtained.

Reclamation and Packing

The reclamation of waste from journal box packing and the preparation of the packing should be done at a central plant or plants, according to the requirements of a given railroad system. All journal packing should be handled in closed metal containers to and from the reclamation plant. The back rolls should also be prepared centrally, and shipped with the packing. The reasons for handling at central points are: First, to secure a uniformly better product; and second, to obtain a lower cost of preparation consistent with the better product.

An objection may be made that the cost of handling will be increased, but it is believed that the improved results obtainable will justify the increased handling charges.

Oil Reclamation Methods

Three methods are used at present for reclaiming the oil extracted from journal packing: (a) Filtering process; (b) separating process, and (c) chemical process.

Filtering—Various mechanical types of oil filters are in service on some roads, employing strainers or straining materials, or both. This process eliminates some of the dirt and solids.

Separating—The centrifugal method, utilizing machines of the cream separator type, are also employed, and frequently are used after the oil has been filtered. This process, also, eeliminates some of the dirt and solids. Heating the oil to the boiling point to drive off the water, where practical, must be done carefully to avoid explosions and scattering of the fluid.

Chemical—In connection with filtration, there may be added a chemical process which breaks down the emulsion formed after heating and stirring of dirty oil and eliminates the moisture after the free water has been removed. This method is, undoubtedly, an advance step in successfully restoring oil to its original condition, rendering it as serviceable for lubrication as new oil.

This chemical and renovating treatment employs, successively, a series of tanks for collecting the old oil from the cleaning vats, treating it with chemicals, evaporating the moisture, separating the solid matter, and for storage.

Changes in Standards Proposed

On the matter of "cleaning boxes," the instructions are changed to read "dust guards and box lids to comply with A. R. A. specifications."

The committee feels that an improvement in the means for protecting journal boxes is needed to insure their being dust and dirt tight.

The committee believes that more attention must be given to the preparation of the journal bearings and it has been specified that bearings be bored, or broached, in order to provide a proper contour for the journal, as well as reveal any imperfection in the lining before it develops defects in service.

In the application of packing to the boxes, the committee feels that improvements will result from the changes outlined, as follows: (a) The back roll is specified 3-in. diameter to insure ample size to make contact on the journal fillet and exclude the dust. The lengths of roll will vary to suit the diameter of journal. (b) Body of packing—The proposed rule describes a good method of forming packing in one piece, keeping the top of packing one inch below the center line of the journal. This is already the practice on many roads, to avoide waste rolling under the bearing.

The committee believes that a uniform practice in packing and maintaining car journal boxes in interchange traffic is an essential factor in American Railway Association standards, especially in making the application of Rule 66 a success.

Inspection

The importance of proper methods of packing journal boxes requires that the employees performing this work be fully instructed.

It is suggested that a full size model be used for the better instruction of box packers. The model of the box should contain the journal, the journal bearing and the wedge. Both sides of the box should be provided with doors, or slides, covering glazed openings for the observation of the interior.

Demonstration with this model would illustrate clearly the right methods of applying packing.

Definition of a Hot Box

In order to have a standard method of reporting hot boxes, a hot box is defined as a box heated above normal temperature so as to require setting the car out, or requiring treatment to take the car to terminal.

The committee now submit the following recommendations to be adopted as standard practice in connection with Rule 66, and further recommend that all work performed under Rule 66 must conform to these standard practices to justify billing for same: Method of packing journal boxes; specifications for dust guards; packing tools for journal boxes; specification for reclaimed oil; specifications for new waste for journal box packing, and inspection of journal boxes.

Method of Packing Journal Boxes Proposed for Standard Practice

Preparation of New Packing—The waste must be loosened thoroughly, placed in a saturating vat and kept completely submerged in new, or properly renovated car oil, at a temperature of not less than 70 deg. F., for a period of at least 48 hours to insure thorough saturation. Then it shall be drained, for the purpose of removing the excess oil, until the packing is in a resilient or elastic condition. Oil should not drip from drained packing when lifted from the drain rack, but oil should flow from it when squeezed in the hand.

Any process of saturation that will accomplish the equivalent result may be used.

Prepared packing in storage should be turned over at least once each 24 hours; or, the oil which has accumulated in the bottom of the container should be drawn off and poured over the top of the prepared packing.

Preparation of Renovated Packing—All packing, when removed from journal boxes for any purpose, shall be pulled into a container, avoiding contact with the ground or any other place where it may pick up dirt, and taken to the waste reclaiming plant. This packing shall not be re-used until renovated.

In reclaiming packing it shall be first picked over carefully and dirt, metal, etc., shaken out. It shall then be placed in a renovating tank of oil at not less than 150 deg F. for a short time and worked for the purpose of loosening it.

After sufficient drainage it shall then have all remaining oil removed by centrifugal force or by pressure process, after which it shall be thoroughly loosened and freed fom dirt or by shaking over a coarse (wire) sceen. Then dried to remove excess moisture. Reclaimed waste shall not contain strands less than 3 inches in length. Dirt and foreign matter shall not exceed 5 per cent.; moisture shall not exceed 7 per cent.

Waste shall then be completely submerged in new or properly renovated car oil having a temperature of not less than 70 deg. F., for a period of not less than 24 hours to insure saturation. Then it shall be drained for the purpose of removing all excess oil, until the packing is in a resilient or elastic condition.

Prepared packing in storage shall be turned over at least once each 24 hours, or the oil which has accumulated in the bottom of the container drawn off and poured over the top of the packing.

Any mechanical process that will accomplish the work as described, can be used.

By renovated car oil is meant oil which has been removed from the packing and put through a cleaning process which shall remove the dirt, grit and foreign matter and restore oil sufficiently to meet the specification for reclaimed oil.

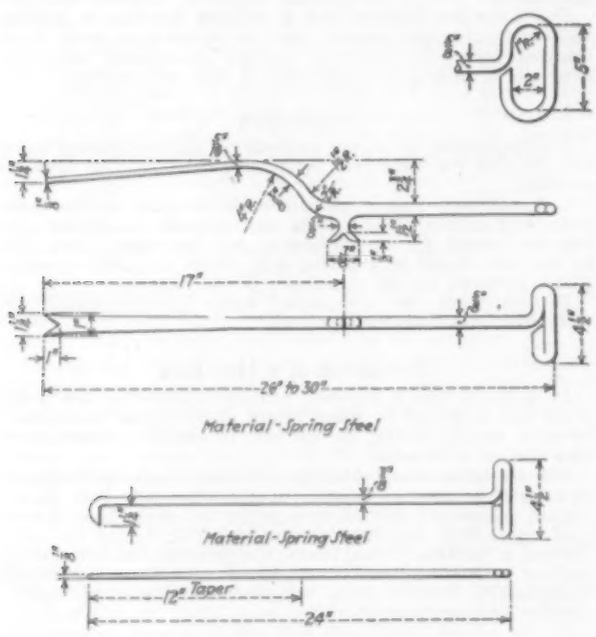
Journal Boxes—Before packing a journal box, the oil cellar shall be thoroughly cleaned of all dirt, sand, scale, and grit, and if water is present it must be removed. When new journal boxes are applied, or when re-applying boxes, the interior of the box, including the dust guard well, shall be so treated, and close fitting dust guards and box lids complying with A. R. A. Specifications shall be applied. Boxes shall be inspected for cracks which might cause oil leakage.

Application of Packing

Back Roll—In packing a journal box, insert a back roll and work it back under the journal to the extreme back part of the box, as shown at "A" in the drawing. Make sure that the roll is well up against the journal so as to properly lubricate the fillet at the end of the journal and to keep out the dust. The 3-in. rolls will insure better contact than a smaller size.

The lengths of the rolls must be made to suit the diameter of the journal and such that the ends shall not extend within less than ½ inch or more than 1 inch of the center line of the journal.

Rolls should be prepared at a central point to insure a uniform and proper product. To form the roll, the necessary amount of dry packing is laid on a flat surface and then rolled to length for a given journal, properly twisted and then wound with twine (3 ply jute; No. 18 B. C. flax or mail twine are suggested), and tied to hold its shape, or spun on a spindle—in which case it is not necessary to be tied. If twisted too tightly, roll will glaze quickly. The roll is to be soaked in oil and drained the same as other packing.



**Above: Packing Iron, Horn or Blade—
Below: Packing Hook Proposed for Standard Practice**

A stock of prepared rolls, properly soaked and drained, should be kept at oil houses and issued to the packers as needed.

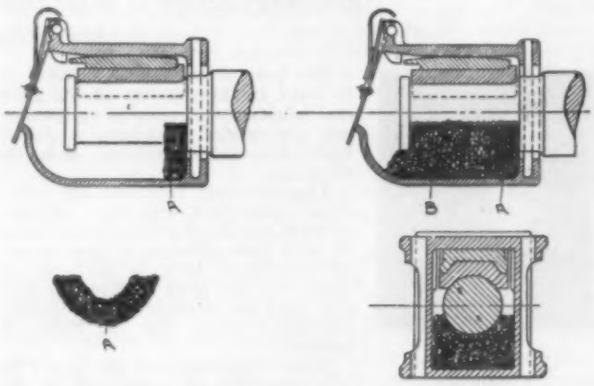
Body of Packing—First wipe off the front of the box. Then, apply sufficient packing, preferably in one piece, to firmly fill the space "B" under the journal, so as to prevent settling away, care being taken to have the packing bear evenly along full length of the lower half of the journal. This is best accomplished by placing the packing across the full width of the mouth of the journal box, and allowing the strands to hang down outside, always adding more packing before placing the hanging strands inside the box. This has the effect of binding all the packing in one mass. The top of the packing should be one inch below the center line of the journal, along the sides, to insure against waste rolling under the bearing. By placing the packing under the journal until the front or outer edge of the collar is reached, the front end of the packing then presents an inclined surface toward the front of the box. No loose ends or threads should protrude at the sides or ends, such ends being carefully tucked under the sides of the packing; nor should any pieces of packing be laid along the side of the journal, as such pieces may become caught under the bearing and cause a hot box.

Note—Front Plug or Dirt Seal—The front plug or dirt seal is not recommended but may be added if so desired and will not be considered a violation of standard practice.

Cleaning and Applying Bearings

Before applying journal bearings, they shall be thoroughly clean and be bored or broached to a proper contour in order to secure a uniform bearing on the journal and to remove irregularities, also to detect imperfections in the lining.

Under no circumstances shall a relined bearing be used unless at least a 1/32-in. cut has been taken by boring the shell before the same is tinned or relined. In relining bearings, no shell shall be used that is below the A. R. A. condemning limit of thickness.



Practice Recommended for Packing Car Journal Boxes

Under no circumstances, is it permissible to use sand paper, emery paper or emery cloth, for the purpose of removing irregularities from the bearing surface. If necessary, a half-round file or scrape may be used. Journal bearings having the lining loose, cracked, broken, spread over the side or worn to the brass, shall be renewed.

When applying or replacing a journal bearing, a coat of lubricating oil must be applied to the bearing surface of the same. Never wipe the bearing surface of the journal bearing with waste.

The surface of the journal shall be smooth and thoroughly clean before the bearing is applied.

Wedge—The wedge shall confom to the limiting dimensions established by this association.

The wedge shall be properly seated on the crown of the bearing, so as not to pinch the side of the bearing nor rest on the lugs.

Specifications for Dust Guards Proposed for Standard Practice

[The proposed specifications for dust guards are practically the same as those proposed by the committee in 1927, with the following exceptions: When the new guard is applied, it must fit the axle with not more than 1/32-in. clearance all around; and it is stated that the material in contact with the axle must be of such composition that it will not cut the axle in service.—Editor.]

Packing Tools for Journal Boxes Proposed for Standard Practice

Two packing tools are required for packing journal boxes, namely; (a) a packing iron, horn or blade, and (b) a packing hook.

The design of the packing iron and packing hook shall be in accordance with drawing.

Specification for Reclaimed Oil Proposed for Standard Practice

The grade of reclaimed oil to be used for lubricating journals for freight and passenger train cars, should meet the following specifications:

Flash and Fire Points—Flash and fire points shall not be lower than the following. Flash point 250 deg. F., and the fire point, 300 deg. F.

Viscosity—The viscosity at 200 deg. F. shall be within the following limits: 50 to 70 sec., based on A. S. T. M. method D-88-26.

Pour Point—The pour point shall not be above a temperature of 45 deg. F. based on A. S. T. H. method D-97-27T.

Precipitation Number of Sediment—The precipitation number of sediment shall not be greater than .5 based on A. S. T. B. method D-96-24.

Water—This oil shall contain not more than .5 per cent. water by volume, based on A. S. T. M. method 9-95-27. The oil must be bright, clean and free from any extraneous solids that will not pass through a No. 325 mesh screen.

Specifications for New Waste for Journal Box Packing Proposed for Standard Practice

Scope—The specifications cover new waste suitable for freight cars.

Material—(a) The waste shall consist of either cotton or wool waste, and the use of a resilient material not exceeding 20 per cent. in weight, is permitted.

(b) The cotton waste shall consist of colored cotton threads, of which not more than 20 per cent. shall be less than 6 in. in length, but none

less than 3 in. The threads shall be of clean, new cotton properly machined and thoroughly mixed, 70 per cent. spooler and 30 per cent. slasher.

(c) The wool yarn, if used, shall consist of new yarn from the product of looms weaving Brussels, Axminster and ingrain carpets or other high-grade woolen fabrics, high-grade merino threads, properly machined and thoroughly mixed.

Mixture—(a) The finished material shall meet the following requirements: Colored cotton waste, per section 2-(b).

Wool Waste, per section 2-(c).

Combination of colored cotton waste and wool waste, as per the above.

The use of a resilient material not exceeding 20 per cent. by weight, is permitted.

Dirt and foreign matter shall not exceed 2 per cent.; moisture shall not exceed 7 per cent.

(b) All packing material shall be free from sweepings, flyings, dirt, jute, or yarn made of hair, commonly known as muck yarn, sea-weed or grass.

Baling—The finished packing shall be put up securely in burlap wrapped bales with substantial hoops. If the total weight of hoops and wrappings exceeds 6 per cent. of the invoiced weight of the shipment, such excess shall be deducted.

Inspection of Journal Boxes Proposed for Standard Practice

[The proposed standard practice for the inspection of journal boxes prescribes that when cars are on repair tracks and not yet due for the attention required by Rule 66, they shall be inspected and given whatever attention is needed, as called for by the A. R. A. instructions. These are essentially the same as those proposed last year, the most important change being that if the packing is found to be glazed on the surface in contact with the journal, it shall be removed and the box repacked. The distance from the center line of the journal to the top of the packing has been increased from ½ in. to 1 in.—Editor.]

Passenger Car Lubrication Proposed for Standard Practice

Passenger car journal boxes should receive the same care in all respects, as has been set for freight car journal boxes, and in addition, the committee recommends that journal boxes on passenger equipment be repacked semi-annually, preferably during the spring and fall, in order that the change from summer to winter oil, and vice versa, may be properly effected. When boxes are repacked, a stencil should be applied diagonally on opposite sides of the car, indicating the day, month, year and station where repacked.

The committee suggests that the above recommendations proposed for standard practice be placed before the members for adoption by letter ballot.

The report was signed by G. W. Ditmore (chairman), master car builder, Delaware & Hudson; H. W. Johnson, superintendent motive power and rolling stock, Minneapolis & St. Louis; P. Maddox, superintendent car department, Chesapeake & Ohio; T. O. Sechrist, assistant superintendent machinery, Louisville & Nashville; G. E. Dailey, lubricating supervisor, Chicago, Burlington & Quincy; M. J. O'Connor, mechanical inspector, New York Central; C. B. Smith, engineer of tests, Boston & Maine; E. Von Bergen, general air brake lubrication and car heating engineer, Illinois Central.

Discussion

F. H. Becherer (C. N. J.): Two years ago when the discussion on Rule 66 occurred, our road did not look kindly on it, as we thought it was too drastic. However, after analyzing our hot-box reports, we obtained some rather interesting data, and finally concluded that if the hot-box situation was to be remedied, there was only one way to do it, and that was to make a start. With that idea in mind, a committee visited a great many roads to find out what system was being used to reclaim and renovate their waste and oil. This committee decided that the best method was to handle the reclamation of oil in accordance with Clause C of the committee's report, which is really not a reclaiming process, but a renovating process.

Not only our officers, but the individual car foremen have given a great deal of time, thought and intensive study to effect a reduction in our hotbox.

When we started two years ago, we found that 66 per cent of the hotboxes were on our own equipment. Today, with our system of repacking boxes, renovating our oil and waste, renewing our journal wedges when worn beyond the limit specified in recommended practice, and placing the journal box and its contained parts in the pink of condition, we have reversed this percentage, and analysis now shows that the hotboxes on our cars are approximately 25 per cent and 75 per cent on foreign cars. This analysis also determined that on our freight train detention, approximately one-third of them consisted of detentions caused by hotboxes.

We all know that there are a number of causes for hotboxes; the one that concerns us at this time, however, is the major cause of hotbox trouble, namely lubrication, or perhaps I should say lack of lubrication. After a careful study and investigation it became evident that better lubrication was necessary if we expected to improve our operating conditions, and we were convinced that if packing could be reclaimed and then renovated that a great portion of our lubrication trouble would be eliminated. It is obvious that economy in lubrication dictates the necessity of packing reclamation; it is equally obvious that reclaimed packing will not solve the hotbox problem. It was evident, however, from our investigation, strengthened by the experience of other roads, that renovated packing would eliminate a great deal of our annoying detentions and materially improve our service.

The result of our study is a packing renovating plant located at our Elizabethport shop where all packing reclaimed on the system is put through a thorough clean-process and then returned to service. It is my opinion that this renovated packing is a better lubricating medium than new material. We will be glad to give to anyone interested our reasons for this opinion after the meeting.

In this morning's mail received a pamphlet attacking reclaimed packing. I, however, have never heard or seen printed one word of objection to renovated packing. If you gentlemen could inspect our plant and process and compare it with some of the reclamation plants, it would be evident to you why no honest objection could be made against the use of renovated material. In this connection may I extend to you a cordial invitation to visit and inspect our plant located at Elizabethport, N. J., just a few miles from Jersey City.

We believe that in fairness to the roads who are renovating packing, and those who will be by January 1, when Rule 66 goes into effect, that it is pertinent for me to say that objections will be made by the Central Railroad of New Jersey to the use of anything but new material in the boxes of our equipment, unless the packing road is renovating packing and oil to the standard of the specifications recommended by the committee. My reason for this is that the analysis of dirty oil shows in some cases 25 per cent water and 15 per cent dirt. So, it can readily be seen that this is caused by a lack of lubrication.

In our opinion, these specifications on reclaimed oil are very light, and our plant is producing oil every day which contains far less precipitation and moisture than is specified, and it is our sincere hope that the specifications outlined by your committee will be supported by letter ballot.

C. J. Wymer (C. & E. I.): There is one point I would like to call attention to. The second paragraph of item 7 on page 5 says "any mechanical process that will accomplish the work as described in paragraph 5 and 6 above can be used." The renovating processes are varied, many railroads are under contract for some processes, and as new processes come into service we hardly believe that that wording is liberal enough. I know some roads are under contract with processes which they think are highly adequate, which accomplish the results desired, but not accomplished quite as outlined in paragraph 5 and 6. I believe if that was changed to

"any mechanical process that will accomplish equivalent results as described in paragraphs 5 and 6 above can be used," it would open up a wider field, and would be on a par with the latitude given for the making of new packing in the second paragraph which says "any process of saturation that will accomplish equivalent results may be used." Personally we would like to see that modification made.

R. D. Hawkins (A.C. L.): I want to refer the matter of boring out brasses 1/32-in. for relining. There are thousands of brasses coming into our foundry where no damage whatever has been done to the brass, and to bore out that brass and weaken the back to me seems like a great waste of material. Our trouble in selecting a brass fit for relining is more on account of collar wear than on account of any wear of the brass itself. It is possible the committee may have had in mind the proposition of loose babbit, by the addition of a little tin, it would increase the expense of the babbit only slightly, but I would hate to have to apply this rule to boring out the brass.

E. Von Bergen (I. C.): For the information of the gentleman that referred to the second clause of paragraph 7 on page 5 that what the committee intended was exactly as he suggested that this be reworded. You will note that in 4, 5 and 6 we describe the hand method, for the benefit of those who will use the hand method, and then we finished paragraph 7 by saying that any mechanical process that will accomplish the work as described in paragraphs 5 and 6 above can be used. That was to take care of those who wanted to use the machine process, and what we meant and intended to convey was that any mechanical process that would accomplish the equivalent of this could be used.

In regard to boring brasses, we went into that matter to a great extent. In one investigation at a fairly good sized terminal we found by examining the brasses in the yards with a hook we detected 84 brasses in three days time that appeared suspicious, and upon taking them out they all had loose linings, and everyone of those brasses were relined brasses.

Now, any expert in the matter of relining bearings or in the manufacture of journal bearings will tell you that it is impossible to make a perfect bond between the white metal lining and the brass on a second-hand brass, if you simply melt out the old babbit and put in new babbit, for the simple reason that the pores of the metal become impregnated with oil to a slight extent. Any time you reline a brass that way it may run but it is a gamble from the day it leaves the tin shop until it comes out.

A good many roads have gone to this extent, and they insist it is really the only process to follow, and that is, not to reline at all.

In order not to make the matter too stringent, and at the same time to get away from gambling on the lining staying in the brass, we specified it would have a 1/32 in. cut. In regard to the weakness of the shells, whenever cuts have been taken until the shell is reduced below the limits established by the specification, then the brass should be recast and a new lining applied. But the only way to play safe if you are going to reline is to handle it that way.

C. A. White (A. C. L.): I am operating a brass lining shop where we handle on an average of about 1,000 brasses a day, and the trouble referred to, if handled in accordance with the A. R. A. manual on recommended practice, will not be experienced. We properly gage all our brasses in accordance with A. R. A. gages, handle the tinning solution—acids and everything—in the manner as prescribed by the committee, and we have found no necessity for reboring the shell on an old brass. That adds additional expense. There is no necessity for throwing the old brass away and making a new brass of it. This cuts down your expense considerably.

We either make 1000 new brasses or reline 1000 old brasses each eight-hour day in our brass shop. We test all brasses after they are relined, and if we find any brass that does not come up to the specification, that brass is rejected on the bench, and not allowed to get in stock or get out and give trouble in service. In that manner we have cut our hot-boxes down I would say about 60 per cent.

Mr. Brazier: I move the report be accepted, and referred to letter ballot where necessary.

(*The motion was carried.*)

Report of Committee on Resolutions

WHEREAS, The Railway Supply Manufacturers Association has this year exceeded all exhibits formerly made, which have been so successfully and interestingly explained to all officers by the individual firms' representatives, and have so generously arranged for the entertainment of members and families of the Mechanical Division;

WHEREAS the Mayor and people of Atlantic City, in providing Marine Hall and other courtesies extended, have continued to make this a city so much to be respected and inviting to our convention;

WHEREAS The Atlantic City Hotel Men's Association has provided so comfortably for our sojourn while in this city;

WHEREAS we do appreciate to the fullest extent the attendance and addresses given to the convention by R. H. Aishton, Hon Frank McManamy, A. G. Pack, Major Clarence W. Young and Dean A. A. Potter, and the moving picture on "Operation of the Steam Locomotive" by John Purcell;

WHEREAS the RAILWAY AGE, as is its usual practice, has in such a prompt and fitting manner, printed all committee reports and discussion and edited the daily arrivals;

WHEREAS the committees have so fully compiled their reports and presented them in such a forceful and interesting manner;

WHEREAS, The Pennsylvania Railroad has so successfully arranged for special convention trains and with the Reading Company and Central R. R. of New Jersey and other railroads, have so liberally provided transportation to the members and their families to enable them to reach Atlantic City;

WHEREAS, the management of Young's Million Dollar Pier has maintained and improved conditions for our comfort in holding our meetings and visiting exhibits;

WHEREAS, the continued interest of the Executives of the American Railway Association in the Mechanical Division lends inspiration to our future work;

WHEREAS, the meetings of the present convention have been so ably planned and guided by the officers, the Secretary and his staff;

Be It Resolved: That the thanks and appreciation of the Mechanical Division be extended to all of the afore-

said mentioned for individually and collectively making it possible for the largest and one of the most interesting conventions ever held. (*The resolutions were adopted.*)

Remarks by Chairman Smart

CHAIRMAN Smart: I want to thank the members for the renewed confidence they have in placing me in the position of chairman for the next two years. It has been a pleasure to fill out the unexpired term of Mr. Sillcox, and any success I have had in conducting these meetings and handling the business of the Association, has been due entirely to the support I have had from the General Committee, the advice they have given me, and the confidence I have had in seeing the splendid attendance and interest displayed by all of our members.

(*The convention adjourned.*)

Final Convention Enrollment Figures

THE total registration at the close of the Mechanical Division convention yesterday exceeded that of 1926 by 59. All of the strictly railroad classifications showed a gratifying increase as will be noted from the following table:

	1922	1924	1926	1928
Mechanical, Division V	1008	1223	1405	1572
Purchases and Stores, Division VI	384	434	480	494
Motor Transport, Division VIII				56
Railroad guests				706
Railroad ladies	1036	1201	1198	1397
Supply men	2304	2670	3135	2647
Supply ladies	575	676	725	754
Special guests	947	1111	901	38
Complimentary				239
TOTAL	6254	7315	7844	7903

Howard J. Melaney, Tenor Singer from the Northern Pacific, and Mrs. Melaney

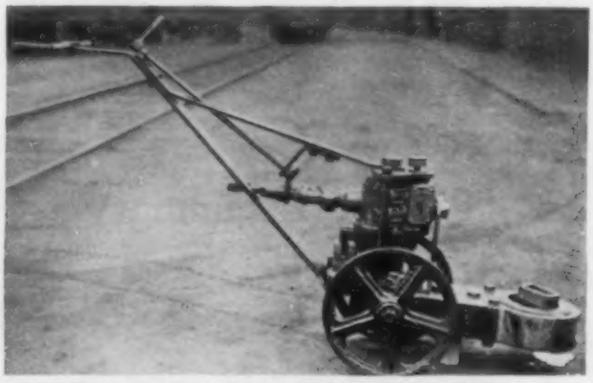
New Devices

Portable Wrench for Column and Journal Box Bolts

AN interesting compressed air-operated device which has been in service for over two years in the car repair shops of the Baltimore & Ohio, has been on exhibit in the booth of the Westinghouse Air Brake Company during the convention. This device, which

Application of the Air-operated Column Bolt Wrench

is patented by C. W. Galloway, vice-president, Baltimore & Ohio, is a wrench for removing, applying and tightening column and journal box bolts, which can easily be moved about the yard and operated by one man.



Handy Portable Column Bolt Wrench, Driven by a Compressed-air-operated Motor

The Baltimore & Ohio has been using this wrench in connection with its unit-spot system of car repairs. One of these wrenches is furnished to each unit of 50 men. A total of 32 units are employed in the various car repair shops on the system, making a total of 32 of these wrenches now in service. During the past two years this wrench has been found to possess a number of ad-

vantages, among which are the assurance of tight column and journal box bolts, and a saving in labor and material of approximately 60 per cent over the old method of performing the same operation by hand.

Under the operation of the unit spot system, the man assigned to operate this wrench starts at one end of a spot and proceeds down one side of the line of cars and back on the other. The bolts are prevented from turning by placing a notched plate over the heads of the bolts on top of the truck frame, or journal box, as the case may be. If the nut cannot be readily removed with the wrench, it is burned off, as a nut which has to be forced off is considered unfit for further service.

Nuts are applied in practically the same manner. The operator of the wrench starts the nut on the bolt by hand. He then applies the wrench and turns the nut up until the pressure exerted on it forces the handle of the wrench to one side. The operator then strikes the head of the bolt with a hammer, applies the wrench a second time and tightens it up, until the handle starts to move a second time, which is an indication to the operator that the bolt has been drawn up tight to the truck frame or journal box brackets.

The wrench can be operated satisfactorily on the air pressures usually found in yard service, but a pressure from 90 to 100 lb. is preferable. With this air pressure, the motor will tighten the nut on the bolt sufficiently to prevent any movement of the various truck members while in service. Tests have shown that with this wrench operating with from 90 to 100 lb. pressure, the large majority of nuts will be drawn up so as to place a strain on the bolt equivalent to its allowable working stress. The wrench is provided with removable sockets and provision is made on the chassis of the device for the transportation of additional sockets which will fit the various sizes of nuts used.

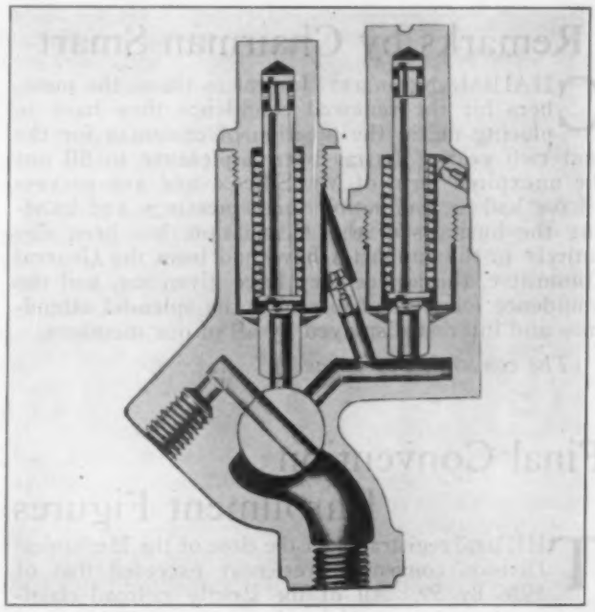
H. T. Bentley, formerly at the head of the mechanical department of the Chicago & North Western, has retired from active service since the last Atlantic City convention. This does not mean by any means that he has lost his interest in the railroad mechanical department. Few men have followed the convention proceedings more closely and the editors of the DAILY realize that he is one of the most careful and critical readers of its pages judging from a couple of typographical errors that he has drawn to our attention.

Long-Life Pressure-Retaining Valve

AN improved type of double pressure-retaining valve has been developed by the Westinghouse Air Brake Company, Wilmerding, Pa., to insure more consistent functioning over longer periods, to insure proper repairs, and to reduce maintenance costs.

One of the major improvements is the combined cap, spring, and valve structure in which, after the original assembly, the spring valve cannot be changed by unauthorized persons, or the valve seat be destroyed by improper grinding. A marked improvement in the uniformity of valve action is also secured. The valve and spring guide are in one piece which has an annular groove near the upper end. A pin driven part way through the cap and projecting into this groove, permits the valve to lift under pressure but prevents removal of either the valve or spring from the cap, unless the pin is drilled out.

Other improvements are embodied in this new design. A fixed choke orifice is placed in the passage between the high-and-low-pressure chambers, and located somewhat



After the Original Assembly of the Combined Cap, Spring and Valve Structure the Spring Valve Cannot Be Changed by Unauthorized Persons

above the bottom of the high-pressure chamber where it is protected from dirt that may accumulate. In the low-pressure cap nut the blow-down choke is in a brass plug which is non-corrodible, precluding the possibility of the orifice becoming restricted by rust. Both this and the intermediate choke are coned so as to prevent dirt from accumulating and closing the port.

First Class Sleeping Compartment on South African Railways